ENVIRONMENTAL IMPACTS

4 ENVIRONMENTAL IMPACTS

4.1 POTENTIAL IMPACTS & PROPOSED MITIGATIVE STEPS

TABLE 4-1: IMPACT AND MITIGATION TABLES

Action		Potential Impact	Mitigative Steps
Sedimentation	Mining	Minor Negative	Channel run-off to storm water ponds for sedimentation
	Construction Activities (Loading Station, road and railroad)		Channel run-off to storm water ponds for sedimentation and regular road maintenance
	Rehabilitation	Major Positive	Rehabillitation will be done to off-set any potential sedimentation problems through the use of contouring and revegatation.
Conclusion: With proper systems and monitoring in place this potential impact can be kept at a minor negative should it occur.			
Leaching	Mining	Minor Negative	Minimize exposed stockpiles; construct Storm Water Run-off Collection Pond. Collected pond water will be used for dust suppression.
	Rehabilitation	Major Positive	Rehabillitation will be done to off-set any potential leaching.
Conclusion: Bauxite is a chemically stable soil of neutral pH. Therefore will be no exposure of any mineral substance which will be dissolved by rain to critically change the soil pH			

Action		Potential Impact	Mitigative Steps
Fugitive Emissions	Mining	Major Negative	Supplement natural moisture content of ore, fast cleaning up of spilled bauxite, limiting stockpile time at mine site and sprinkling with water if necessary. Jamalco will adhere to Government of Jamaica Standards, ISO 14001 Principles and Jamalco's Spill and Release Protocols. This is not an expensive mitigation that is already practiced
	Transportation of ore to Plant, spillage on roadways, unattended stockpiles, blending activities	Minor Negative	Jamalco will adhere to Road Traffic laws for transportation of materials on public roads. Maintain and irrigate haul roads, cover trucks, limit time stockpiles are unattended, quick cleanup of spilled materials. Standard procedures at Jamalco that will be maintained
	Construction Activities (Loading Station, road and railroad)	Minor Negative	Properly plan and coordinate activities, educate and use contractors who are trained and will comply with Jamalco's principles and standards, monitor activities closely Monitoring of contractors is ongoing and incurs no new costs
	Rehabilitation	Major Positive	Rehabilitation activities including recontouring of mined out areas and revegetation will significantly reduce, if not eliminate the potential for emissions. Haul roads (where practical) may be converted to parochial roads or will be rehabilitated also.
Conclusion: With proper systems and monitoring in place this potential impact can be kept as a minor negative. It is practically impossible to eliminate this impact and Jamalco will conduct periodic monitoring of the ambient air quality throughout the mining area and surrounding communities for particulate matter.			

Action		Potential Impact	Mitigative Steps
Noise & Vibration	Mining	Minor Negative	Mining activities will be primarily away from major residential areas and settlements. In areas where blasting will be required, blasting surveys will be conducted. We will comply with the laws governing the use and storage of explosive and use expertise to localise the effects of blasting. Active monitoring of noise levels in communities and continuous communication will be practiced throughout.
	Transportation by Rail and Truck	Minor Negative	Implement and enforce train speeds to minimize noise. Upgrade tracks to better accommodate weight of ore. Train and monitor truck drivers in maintaining speed limits, use of compression, horns, etc. Utilise dedicated haul roads as much as possible. Jamalco will comply with all rules and regulations related to road and rail transportion. These are activities that are part of Jamalco's principles and protocols for this type of activity and will incur no additional cost to implement.
	Loading Station Operations	Minor Negative	Remote location of load station will offer buffer from communities and settlements. Equipment will be acoustically engineered to reduce noise impacts and monitoring of noise levels will be conducted at fence lines. Jamalco will meet National and Alcoa Standards for noise.
Conclusion: It is practically impossible to eliminate impacts related to noise and vibration from occurring. However, based on implementation of procedures, protocols, proper planning, training and monitoring of employees and their activities, this impact can be maintained easily as a minor negative.			

Action		Potential Impact	Mitigative Steps
Loss of Biodiversity	Mining and Load Station Siting	Major Negative	Jamalco has signed a Memorandum of Understanding with the Forestry Department to develop a land cover revegetation and habitat creation plan through technologies involving preservation and creative conservation. Jamalco is committed to maintaining the guidelines from the Bauxite Mine Rehabilitation Standards & Guidelines (1994). While cost has not yet been fully determined, the expansion budget of Jamalco has made accommodation for implementation of this MOU.
	Rehabilitation	Major Positive	Through the MOU with Forestry, the area will be rehabilitated with native vegetation that will over time recolonize.

Conclusion:

The loss of biodiversity is an unavoidable negative impact of mining activities. Systems have been put in place to assess, identify and preserve any rare, endemic or otherwise valuable species that may be found in the mine areas. While it is agreed that bauxite soils do not support high levels of diversity in vegetation because of its infertility, care has been taken to complete the necessary assessments and to identify and preserve all valuable features of the lands biodiversity.

Jamalco has significant experience in rehabilitation and revitalization of mined out areas and has developed and continues to conduct research and development work on its science & technology.

Action		Potential Impact	Mitigative Steps
Subsistence Farming	Mining	Major Negative	Farmers who leased lands from Jamalco or the Government will be relocated to other available lands and assistance will be provided by Jamalco in re-establishing their plots. The replacement situation will be the same or better than before.
	Rehabilitation	Major Positive	In many cases, affected lands will be returned to a condition where it can be used for various types of farming activities. Animal husbandry and tree crops may be two of the more suitable options.

Conclusion:

The displacement of farmers is an unavoidable impact. Jamalco has always worked with the people of the communities in which they operate to ensure that any negative impact caused by the operation has a suitable remedy or solution. This situation will be no different.

Action		Potential Impact	Mitigative Steps
Loss of natural features such as habitats, niches and species	Site Clearance and Preparation	Major Negative	Bauxite is found in the open fields between the hillocks. Areas to be cleared will therefore be kept to the open fields. All precautionary measures will be put in place to ensure habitats on hillocks are not affected.
	Mining Operations	Major Negative	During mining operations all steps will be put in place to ensure heavy machinery and workers do not damage the hillocks and the habitats therein. This may include at a minimum red tagging at foot of hillocks.
	Rehabilitation	Major Positive	Jamalco has signed a Memorandum of Understanding with the Forestry Department to develop a land cover revegetation and habitat creation plan through technologies involving preservation and creative conservation. Jamalco is committed to maintaining the guidelines from the Bauxite Mine Rehabilitation Standards & Guidelines.

Conclusion:

The loss of biodiversity is an unavoidable negative impact of site clearance and mining activities. Systems have been put in place to assess, identify and preserve any rare, endemic or otherwise valuable species that may be found in the mine areas. While it is agreed that bauxite soils do not support high levels of diversity in vegetation because of its infertility, care has been taken to complete the necessary assessments and to identify and preserve all valuable features of the lands biodiversity. The biological diversity of the hillocks will be maintained at all cost, as these areas hold the major floral and faunal species of the region, as well as providing niche communities for the various species known to inhabit the area.

Jamalco has significant experience in rehabilitation and revitalization of mined out areas and has developed and continues to conduct research and development work on its science & technology.

Action		Potential Impact	Mitigative Steps
Water Supply	Mining Operations	Minor Negative	Rehabilitation will lessen impact on the watershed through reintroduction of vegetation. Ore deposits are well above the water table and mining should not impact groundwater. Artificial ponds will be constructed to hold stormwater for reuse in dust suppression activities. The control of fugitive dust will allow for the protection of tanks and open water catchment.
	Potable Consumption (Communities)	Major Positive	Jamalco will work with NIC and NWC to provide potable water to communities and settlements in North Manchester
Conclusion: While mining activities will have a potential minor negative impact on water supply, Jamalco will be providing potable water solutions to communities in the area through the provision of potable water in conjunction with the NIC and NWC. At present the majority of communities rely on rain water or water delivered by trucks.			

Action		Potential Impact	Mitigative Steps
Waste Management	Mining	Minor Negative	Waste materials will be sorted and managed in keeping with Jamalco standards. Certain vegetative matter and mining rejects will be used as backfill during mine rehabilitation. Vehicle maintenance waste from mining equipment will be managed in keeping with Jamalco standards and procedures.
	Loading Station	Minor Negative	Defined waste collection areas with proper labelling and instructions will be located at the mining offices. Jamalco will utilize its existing waste collection protocols and will continue to manage and dispose of all grades of waste in keeping with its current standards and procedures. Proper training and direction will be provided to all employees in waste handling and management at the site. All waste generated at Green Vale will be transported to and disposed at the Clarendon Alumina Works LAndfill for proper disposal.
Conclusion: Generation of solid waste is unavoidable. The quality of the systems, standards, procedures and training is the determining factor in how well the management programme works. Jamalco has a solid reputation for proper handling and management of all varieties of waste materials at all its operations.			

Action		Potential Impact	Mitigative Steps
Sewage	Mining	No Impact	Sewage generated at the mines will be managed through the use of portable chemical toilets or the construction of temporary facilities. These will be managed using Jamalco's time tested approaches and within the regulations. Minimal Cost and recognised aspect of the mining operation
	Loading Station	No Impact	A tertiary level sewage treatment system will be designed and constructed at the loading station. The proven SRC biodigester system is proposed. Cost – approx. JA$ 4M – 6M
Conclusion: Sewage handling, treatment and disposal resulting from Jamalco's operations will not present any negative impacts to the environment or communities within the project area.			
Labour	Mining	Major Positive	Increased employment will be welcomed in the communities. No mitigation required.
	Loading Station	Major Positive	Increased employment opportunities and support for satellite businesses.
Conclusion: The proposed hiring of approximately 100 new employees for mining and load station positions represents a major positive impact to these communities. Additional employment in areas of transportation (consideration is being given to the utilization of smaller over-the-road trucks rather than large 100 tonne trucks sub-contracted from the surrounding areas) to move bauxite from mines to load station among other informal job and opportunity creation will be important to the communities in the area.			

Action		Potential Impact	Mitigative Steps
Aesthetics	Mining	Major Negative	Aesthetics in the mining areas will be affected significantly. Mitigation involves minimize the clearance of areas only to what is absolutely necessary. Jamalco's track record and commitment to a proper rehabilitation and revitalization program along with their MOU with the Forestry Department.
	Bauxite Transportation	Minor Negative	The proposed RopeCon conveyor will be visible and may detract from the natural look of the area. However, 70% of the structure is reusable and will be removed from the landscape upon completion of mining activities.
	Rehabilitation	Major Positive	Through the MOU with Forestry, Jamalco will work to rehabilitate the mined areas with a view to restore them to a similar look as existed prior to mining.
Conclusion: The impacts related to aesthetics are reversible. Jamalco's commitment to rehabilitation and revitalization will ensure that the mined out areas are returned to visual and physical usefulness in keeping with local and their own corporate rehabilitation guidelines.			
Archaeological & Historical Heritage	Mining	No Impact	All known and identified archaeological or historical heritage resources will be avoided or preserved. Any unknown resources or artefacts unearth will be managed as directed by the Jamaica National Heritage Trust (JNHT) approved guidelines for managing archaeological and historical heritage items discovered during such activities, It includes specific methods of operation including necessary contacts and procedures to follow.
Conclusion: A lot of work has gone into the identification of heritage resources in the mining area, Jamalco is committed to the preservation of all such items and will work with the JNHT to this end.			

Action		Potential Impact	Mitigative Steps
Residential Relocation	Mining	Minor Negative/ Minor Positive	The negative impacts surround change of traditions and lifestyle. Housing solutions provided by Jamalco have been consistently of high quality, cost and standard and will remain so. In most cases relocated individuals are placed in better living conditions than before. Dialogue will be maintained between those likely to be relocated to assist in their reintegration with as little disturbance as possible.
	Railroad Rehabilitation and Upgrade	Minor Negative/ Minor Positive	Housing solutions provided by Jamalco have been consistently of high quality, cost and standard and will remain so. In most cases relocated individuals are placed in better living conditions than before. Dialogue will be maintained between those likely to be relocated to assist in their reintegration with as little disturbance as possible.
	Rehabilitation	Major Positive	Upon completion of rehabilitation activities, many of the rehabilitated lands will be suitable for residential developments and will be a benefit to the development of the communities.
Conclusion: Circumstances will occur that require relocation of residents of the various communities impacted through mining and railroad upgrade. The best possible situation is for dialogue and implementation of Jamalco's proven relocation programme. This may be an unavoidable impact, however, suitable mitigation is readily available.			

Action		Potential Impact	Mitigative Steps
Utility Relocation	Mining	Minor Negative	Displaced utilities will be replaced in a timely manner, with service that is the same or better than before. This includes potential electricity, water and road impacts. All efforts will be made to minimize disruption to the communities. Where possible the replacement will be put in place before the existing service/utilizing is impacted.
	Railroad Rehabilitation and Upgrade	Minor Negative	Displaced utilities will be replaced in a timely manner, with service that is the same or better than before. This includes potential electricity, water and road impacts. All efforts will be made to minimize disruption to the communities. Where possible the replacement will be put in place before the existing service/utilizing is impacted.
Conclusion: In many cases this is an unavoidable impact. Where service can be maintained or restored with the least amount of discomfort it shall be done. With effective management, this impact may not be realized as a negative.			

Action		Potential Impact	Mitigative Steps
Natural and Stormwater Drainage	Mining	Major Negative	Natural drainage regimes will be impacted during mining. This is unavoidable and through Jamalco's mine rehabilitation programme the mined out areas will be restored to a usefulness incorporating both natural and stormwater drainage.
	Transportation Rehabilitation and Upgrade	Minor Negative	Rehabilitation and upgrade of the railroad corridor will involve soil movement in some areas that will impact upon natural or designed drainage areas. These are unavoidable impacts, however, care will be taken to insure that where necessary new drainage regimes are designed into the works and that the solutions are suitable for the relevant areas of interest.
	Loading Station Construction	Major Negative	Many areas of natural drainage will be modified to construct the loading station. This is unavoidable. The comprehensive plans and designs will take drainage into consideration as it is important to the stability of the areas and to the protection of surrounding communities.
	Rehabilitation	Major Positive	Rehabilitation plans will incorporate designs for natural drainage and stormwater management.
Conclusion: While It will be impossible to eliminate impacts related to drainage, Jamalco possesses the technology and know-how to properly design and construct alternative drainage solutions that will serve to eliminate potential problems. In some cases, flood prone areas can be alleviated through this process.			

Action		Potential Impact	Mitigative Steps
Transportation and Travel Disruption	Mining	Minor Negative	Mining areas are usually away from public roadways and where necessary bypass roads are always constructed to service or avoid the surrounding communities. Road realignment at the Loading Station at Green Vale will be done to limit traffic disruption and to regularise the movement of vehicles through the community in light of the station being located as proposed. This will be designed to minimise walking distances and the temptation and risk associated with crossing active railroad tracks.
	Transportation Rehabilitation and Upgrade	Minor Negative	Sections of the railroad corridor are used by other bauxite companies. Jamalco will coordinate all work on the corridor with these companies to insure no or very little impact on their service. In two areas (the bridge where the train goes under the Melrose Bypass, and a small rail bridge near Broadleaf), there is the potential for traffic disruption during work on bridges. In both cases, solutions will be fully constructed prior to making any changes to the existing situation to limit any disturbance to users.
	Temporary Transportation of bauxite by Truck	Minor Negative	The use of trucks to transport bauxite for a temporary period will add to the congestion on roadways. However, Jamalco has made a concerted effort to reduce the frequency of movement, and the number of trucks to 10; and will not dispatch trucks during peak hours. Appropriate signs and flag men will be placed at strategic locations to minimise disruption.
Conclusion: Temporary transportation disruption will occur with this project. However, all systems are in place from the early planning stages to limit this disruption. Constructing bypass roads, constructing solutions fully before making changes and limiting the number of trucks on the roads will go a long way towards limiting transportation and travel disruptions. Jamalco will comply with the laws and regulations of Jamaica regarding traffic management, including the operation of vehicles on public roads.			

Action		Potential Impact	Mitigative Steps
Infrastructure Improvements in Communities	Water Supply	Major Positive	Jamalco is working with NIC, WRA and NWC to provide potable water to the communities in the project area. No mitigation required.
	New School – Mile Gully	Major Positive	The Government of Jamaica through the Ministry of Education will be constructing a new school in the Mile Gully area and Jamalco will be actively participating in the process. Positive impact no mitigation required.
	New and Improved Roadways	Major Positive	Jamalco will construct bypass roads, upgrade existing roads and build bridges/tunnels at key locations to alleviate impacts associated with travel disruption, delays and poor road condition. Positive impact no mitigation required.
Conclusion: These are positive impacts associated with the project. In many ways, the implementation of this project is a win-win situation.			

Action		Potential Impact	Mitigative Steps
Socio-Economic Benefits	Permanent Employees	Major Positive	Jamalco will employ a maximum of 100 new employees at the Green Vale Loading Station/Mining Operations. Many of these persons will come from the surrounding communities. A positive impact, no mitigation required.
	Truckers	Major Positive	Private truckers will be hired for hauling bauxite from both the mines and during the temporary period to St. Jago. Many operators will be from local communities. No mitigation required.
	Temporary Workforce	Major Positive	Jamalco will hire skilled/unskilled employees during preparation and construction activities to provide various services. Employees will be sourced from local communities for these positions. This includes work at the loading station, railroad. Positive impact, no mitigation required.
	Indirect Benefits	Major Positive	Stimulate economy of area through physical, economic and social development. Sub-regional development will impact various other townships externally.
Conclusion: These are positive impacts associated with the project, which are in keeping with the Government's integrated development, policies and plans facilitated by improvements such as Highway 2000 and South Coast Development Plans. In many ways, the implementation of this project is a win-win situation.			

SOCIO-ECONOMIC ANALYSIS OF PROJECT IMPACTS

5 SOCIO-ECONOMIC ANALYSIS OF PROJECT IMPACTS[1]

5.1 INTRODUCTION

Jamalco has a vested interest in the opinions, attitudes and views of the constituents of the communities in which it does business. As a result, they have been in direct contact with community members, area leaders and even Members of Parliament in several of the communities that will be impacted during this project. This report presents the findings of a socio-economic survey conducted among residents within the radius of influence of the project between May and June 2004 and the major issues from community consultations conducted in Mile Gully on June 23, 2005 and Mt. Oliphant on July 28, 2005.

5.2 OBJECTIVE

The objective of the socio-economic survey was to determine the level of knowledge of the population of the existing and proposed operations, to ascertain their views on the impact of the operations as well as to hear what they perceived as solutions to existing problems.

The major objective of the follow-up consultations was to determine if the previous issues remain the same, or if new issues have surfaced now that the communities are more aware of the plans for the area.

5.3 METHODOLOGY

The socio-economic survey was based on a 5 per cent sample of households from the enumeration districts in the study area (as defined by the Statistical Institute of Jamaica) for the 2001 Population Census. The households for administration of the questionnaire were selected at random by the interviewer, within the enumeration districts. The respondent in all instances was the household head.

The information collected through the questionnaire included the following:

1. Personal Characteristics
    - Age and Gender
    - Number of Years Lived in the Community
2. Opinions on the community
    - Factors most preferred
    - Factors least preferred
    - Benefits of large scale development to the community
3. Awareness and Opinions on Existing Bauxite Operations
    - Perceived negative impacts
    - Perceived positive impacts

    Knowledge of and Views on Development Plan as they relate to:
    - Economic Value of the Community
    - Pollution specifically
    - The Local Environment generally
    - The Individual
    - Job Opportunities
4. Water Availability
    - Source of drinking water
    - Perception of water safety

5. Miscellaneous

- Awareness of community activities by Jamalco
- Working experience in bauxite industry
- Receipt of compensation for pollution problems

In most instances the questions allowed for multiple responses. The responses were coded and the data captured. SPSS (a statistical computer program) was used to produce tabulations, which form the basis of the analysis presented in this report. The findings as they relate to the two main areas of the parishes indicated are summarized below.

The follow-up consultations sought to provide direct answers to direct questions from the people of the communities.

5.4 THE SURVEY POPULATION

A total of 278 respondents were covered in the survey, 141 women and 137 men. All but 3 persons reported their age. One man was less than 20 years old and 43 persons were 60 years and over. The majority of the sample (83 per cent), therefore ranged between 20 and 59 years.There was a degree of stability as it relates to residence as the majority of residents (63.8 per cent) have lived in the communities for more than twenty years.

5.5 THE COMMUNITIES

While the selection of the areas for interviewing were based on the enumeration districts as defined by STATIN, the communities as presented in this report were defined in the field by the interviewer and the respondent. Accordingly it is possible for a number of communities to cross Ed boundaries. The list of communities identified appears as Figure 5-1 below. The Population Density is illustrated in Figure 5-2

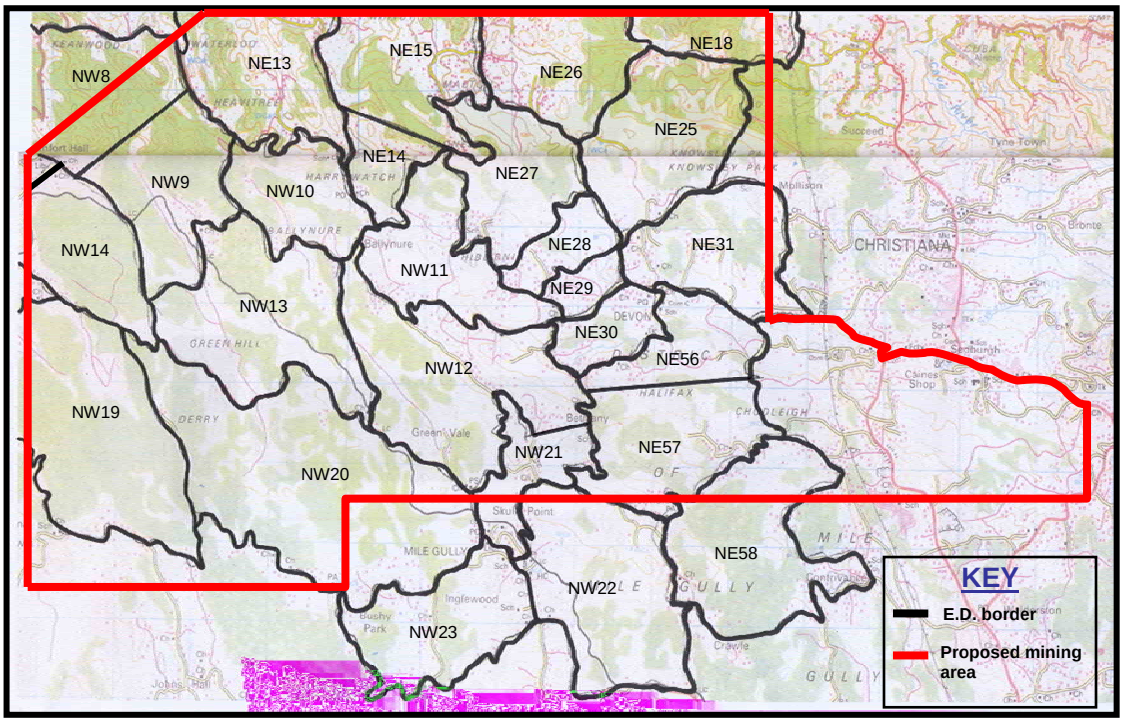

FIGURE 5-1: ENUMERATION DISTRICTS SURVEYED FOR NORTHERN MANCHESTR

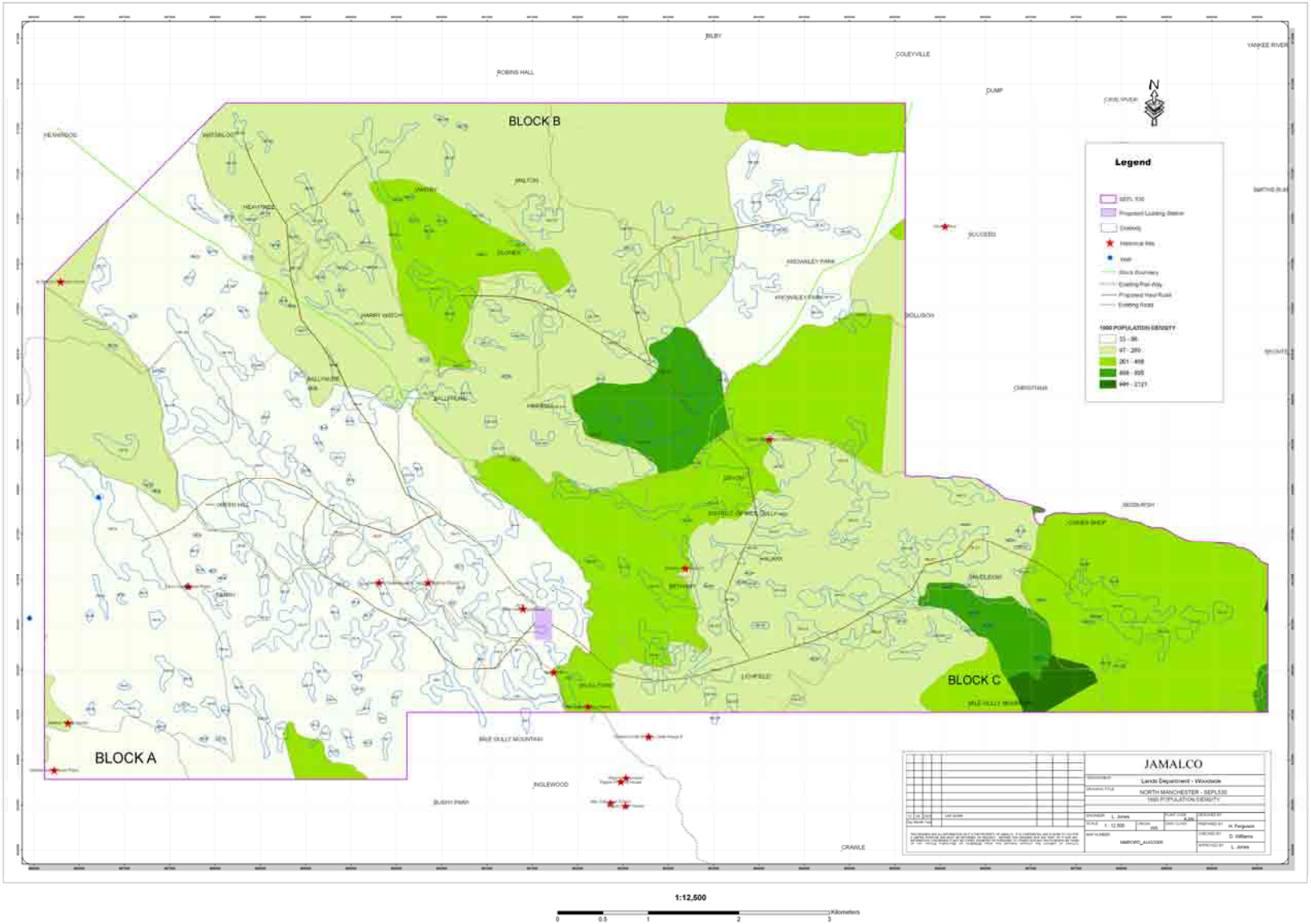

FIGURE 5-2: POPULATION DENSITY FOR SPL530

5.6 DEMOGRAPHIC AND SOCIAL PROFILE

The total population identified for this area in the 2001 census was 13,000. Males were predominant, comprising 52.4 per cent of the total. The women were on average older than the men with an average age of 30.7 years compared to 29.2 years for men. In relation to educational attainment approximately 52 per cent of the population 15 years and older had attained a secondary level education, while 4 per cent had attained tertiary level.

There were 3,147 housing units in the area, 90 per cent of which were of the separate-detached type. The main material used in the construction of the housing units was concrete. Average household size was 3.5. While approximately 67 per cent of units were owned, 31 per cent was occupied under lease and rent free arrangements.

The main source of water for 62 per cent of the approximately 3,400 households, was the private catchments. The pit toilet was the main type utilized by about 70 per cent of households.

5.7 FINDINGS OF THE STUDY FOR COMMUNITIES

Due to the small size of the community samples, the analysis will be presented on the basis of the absolute numbers and not on percentages.

5.7.1 MILE GULLY

5.7.1.1 THE SURVEY POPULATION

A total of 37 respondents were covered in the survey, 21 men and 16 women .The majority of persons (22) ranged between 20 and 49 years. The majority of persons (25) have lived in the community for more than 20 years.

5.7.1.2 MAIN FINDINGS

5.7.1.2.1 OPINIONS ON THE COMMUNITY

- Thirty four persons reported that they liked the community because it was quiet there were 27 responses each for friendly people and no crime and violence.
- Unemployment (38) and lack of utilities (28) were the main reasons given for not liking the community.
- Thirty four of the 37 residents interviewed saw "large scale development as beneficial to the community". Job opportunities and the potential for development of skills were seen as the primary reasons for this view.

5.7.1.2.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- Thirty three (33) persons said that they were aware of the existence of bauxite or alumina processing plant operations in the area and 19 of them said that they had not experienced any negative impacts from the operations.
- The 14 who reported that the operations had impacted negatively on them identified dust, soot and gaseous emissions and odour as the factors affecting them.
- Twelve persons agreed that the bauxite facility has had negative impacts on the people in the community. The reasons given were that, the area has widespread corrosion (9); and the area smells of caustic soda (5).
- Twenty nine of the 33 respondents agreed that the bauxite facility has had positive impacts on the people in the community mainly because of the job opportunities (26).

5.7.1.2.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- Twenty seven of the 37 persons interviewed were aware of the Development Plan, 23 thought the impact on the economic value of the community would be positive and 26 saw the impact on job opportunities as positive.

- With regard to the impact on pollution, 8 persons saw it as positive, 7 saw no change and 5 did not know.

- While 14 persons felt the upgrade will *not* affect them personally, 8 felt it would and 5 were not sure.

- The responses to the question on the main impact overall of the proposed upgrade suggested positive as well as negative factors. The prospects of job opportunities emerged as the main impact with 23 responses identifying this with 'better community relations' having 19 responses. The main negative impact was seen as 'more air pollution and noise' (8).

- As reasons for the particular answers given 16 stated that more jobs would be available. Five (5) respondents were of the opinion that the upgrade will add new equipment that will be cleaner to operate.

5.7.1.2.4 AVAILABILITY OF WATER

- The majority (28) of respondents have access to rainwater through the use of tank or drum. Eight respondents had water piped indoor available to them with The National Water Commission as the original supplier to 4. The remaining 4 stated that they were responsible for the provision of the water originally.

- On the issue of water safety, there were 24 respondents indicating that the water was safe to drink. This was so because the water looks and or smells clean as indicated by 22 responses. There were 16 responses stating that the tanks are kept properly covered and or bleach is added to the water. The main reason for the doubts about water safety was related to the lack of piped water in the community.

From the follow-up consultation in the community the issue of water has taken on more importance and relevance for the population. It was emphatically stated at the Mile Gully meeting that, "If there is no water then we will not allow any mining to take place."

Jamalco has entered into sincere dialogue with the NIC and NWC to work out a feasible solution for supplying the communities with potable water.

5.7.1.2.5 AWARENESS AND SOLUTIONS

- Only 9 of the 37 respondents stated that they had ever voiced an opinion on the pollution problem.
- Most persons (23) said they were not satisfied with efforts to deal with the health problems in the community.
- No one had ever received compensation for pollution
- Twenty (20) persons reported that they or members of their household had worked in the bauxite industry.
- Only 5 of the 37 respondents indicated an awareness of programs or activities initiated by JAMALCO.
- As much as 25 responses indicated no knowledge or some uncertainty of what should be done about the pollution problem or did not respond and 3 said there is nothing that can be done. Two (2) responses suggested that the bauxite emissions should be controlled/ reduced and the air filtered.
- In relation to the health problems, the responses were as follows; provide free/partially funded healthcare (17); build/expand clinic (10).
- Eleven (11) persons did not know or did not respond.

5.7.2 CHUDLEIGH/LICHFIELD

5.7.2.1 THE SURVEY POPULATION

A total of 11 respondents were covered in the survey, 4 men and 7 women, with 7 persons being 40 years and over. Nine persons have lived in the community for more than 20 years.

5.7.2.2 MAIN FINDINGS

5.7.2.2.1 OPINIONS ON THE COMMUNITY

- Friendly people, the 'quietness' of the community and the absence of crime and violence were identified as the main reasons for liking the community.
- Unemployment and the dirty environment were the main reasons given for not liking the community.
- Ten (10) of the 11 residents interviewed saw "large scale development as beneficial to the community". Job opportunities and the potential for development of skills were seen as the primary reasons for this view

5.7.2.2.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- Four (4) persons said that they were aware of the existence of bauxite or alumina processing plant operations in the area and 3 of them said that they had experienced negative impacts from the operations.
- The 3 who reported that the operations had impacted negatively on them identified dust, soot and gaseous emissions and odour as the factors affecting them.
- Three (3) persons agreed that the bauxite facility has had negative impacts on the people in the community because of widespread corrosion and the smell of caustic soda.
- Four (4) of the 11 respondents agreed that the bauxite facility has had positive impacts on the people in the community mainly because of the job opportunities.

5.7.2.2.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- Only 4 of the persons interviewed were aware of the Development Plan. All thought the impact on the economic value of the community and on job opportunities would be positive.

- With regard to the impact on pollution, only 1 person saw it as positive, 2 saw it as negative,2 saw no change and 4 did not know.

- Two (2) persons felt the upgrade will affect them personally.

- The responses to the question on the main impact overall of the proposed upgrade suggested positive as well as negative factors. The prospects of job opportunities (2) and more dust in the area (2) were seen as the consequences of the upgrade.

5.7.2.2.4 AVAILABILITY OF WATER

- Rainwater through the use of tanks and drums was the main source of drinking water for the community. Only 1 person had access to indoor pipes and 1 had access to outdoor pipes. The National Water Commission was the original supplier for 1 and the other person was responsible for the provision of the facility originally.

- On the issue of water safety, all 11 respondents indicated that the water was safe to drink. This was so because the water looks and or smells clean and the National Water Commission tested frequently.

5.7.2.2.5 AWARENESS AND SOLUTIONS

- Only 2 of the 11 respondents stated that they had voiced an opinion on the pollution problem.
- Four (4) persons said they were satisfied with efforts to deal with the health problems in the community.
- One (1) person had received compensation for pollution
- Two (2) persons reported having worked in the bauxite industry.
- Only 2 of the 11 respondents indicated an awareness of programs or activities initiated by JAMALCO.
- Ten (10) responses indicated no knowledge or some uncertainty of what should be done about the pollution problem or did not respond.
- In relation to the health problems, the responses were as follows; provide free/partially-funded healthcare (4).

5.7.3 COMFORT HALL

5.7.3.1 THE SURVEY POPULATION

A total of 8 respondents were covered in the survey, 3 men and 5 women. Six persons were under 50 years. All persons had been residents of the community for more than 10 years.

5.7.3.2 MAIN FINDINGS

5.7.3.2.1 OPINIONS ON THE COMMUNITY

- Six persons reported that they liked the community because it was quiet.
- Unemployment and poor roads were the main reasons given for not liking the community.

- Only 2 of the 8 persons interviewed saw "large scale development as beneficial to the community". Job opportunities and the potential for development of skills were seen as the primary reasons for this view.

5.7.3.2.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- Three (3) of the eight said that they were aware of the existence of bauxite or alumina processing plant operations in the area and none of them reported any impacts, negative or positive, on themselves or the community.

5.7.3.2.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- Although none of the 8 persons interviewed was aware of the Development Plan they thought the impact would be largely positive, there were 3 responses indicating a positive impact on the economic value of the community and 7 for positive impacts relating to job opportunities.

- With regard to the impact on pollution, 3 persons saw it as positive, 2 saw as negative and 3 did not know.

- Only 1 person felt there would be personal effects from the upgrade.

- The responses to the question on the main impact overall put the prospects of more jobs primary.

5.7.3.2.4 AVAILABILITY OF WATER

- Three (3) of the respondents had access to water by way of indoor pipes. The others used rainwater (2), outdoor pipes (1) and public standpipe (1). The National Water Commission was the original supplier of the piped water.

- All 8 persons thought the water was safe for drinking because it was tested frequently by the NWC and it looked and smelt clean.

5.7.3.2.5 AWARENESS AND SOLUTIONS

- There were 2 persons who said that they had voiced some opinion on the topic of pollution.
- Three (3) of the 8 persons expressed satisfaction with what is being done in relation to health problems in the community.
- No one had ever received compensation for pollution
- Two (2) persons reported that they or members of their household had worked in the bauxite industry.
- Only 1 of the 8 respondents indicated an awareness of programs or activities initiated by JAMALCO.
- Generally there was no knowledge of what should be done about any pollution problem but there were 5 responses suggesting that a possible solution to health problems would be to build/expand clinic.

5.7.4 CONTRIVANCE

5.7.4.1 THE SURVEY POPULATION

A total of 4 respondents were covered in the survey, 3 men and 1woman ranging in ages between 20 and 59 years. All 4 persons had lived in the community for more than 10 years.

5.7.4.2 MAIN FINDINGS

5.7.4.2.1 OPINIONS ON THE COMMUNITY

- Friendly people and the 'quietness' of the community were identified as the main reasons for liking the community.
- Poor roads, unemployment and a lack of utilities were the main reasons given for not liking the community.

- All 4 residents interviewed saw “large scale development as beneficial to the community”. Job opportunities and the potential for development of skills were seen as the primary reasons for this view

5.7.4.2.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- All 4 persons said that they were aware of the existence of bauxite or alumina processing plant operations in the area and they reported that they had experienced negative impacts from the operations.

- Dust, soot and gaseous emissions and damage to property were identified as the factors affecting them.

- Three (3) persons agreed that the bauxite facility has had negative impacts on the people in the community because of widespread corrosion and the smell of caustic soda.

- The 4 respondents agreed that the bauxite facility has had positive impacts on the people in the community mainly because of the job opportunities.

5.7.4.2.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- Three (3) of the 4 persons interviewed were aware of the Development Plan. All thought the impact on the economic value of the community and on job opportunities would be positive.

- With regard to the impact on pollution, 2 persons saw it as negative while 1 saw no change.

- Only 1 person felt there would be personal effects from the upgrade.

- The responses to the question on the main impact overall of the proposed upgrade suggested positive as well as negative factors. The prospects of job opportunities (2) and more dust in the area (2) were seen as the consequences of the upgrade.

5.7.4.2.4 AVAILABILITY OF WATER

- Rainwater through the use of tanks and drums was the main source of drinking water for the community. No one reported access to piped water.
- As regards water safety, 2 respondents indicated that the water was safe to drink while 2 said it was not It was seen as safe because it looks and smells clean. It is seen as not safe because it is not treated properly (1) and bauxite mining affects water (1).

5.7.4.2.5 AWARENESS AND SOLUTIONS

- Three (3) of the 4 respondents stated that they had voiced an opinion on the pollution problem.
- All 4 persons said they were not satisfied with efforts to deal with the health problems in the community.
- One (1) person had received compensation for pollution
- One (1) person reported having worked in the bauxite industry.
- No one indicated an awareness of programs or activities initiated by JAMALCO.
- While there were 2 responses indicating no knowledge or some uncertainty of what should be done about the pollution problem, 2 suggested providing medical assistance and conducting more surveys to determine problems and solutions.
- In relation to the health problems, the responses were as follows; provide free/partially-funded healthcare (2); build/expand clinic (2).

5.7.5 HALIFAX

5.7.5.1 THE SURVEY POPULATION

A total of 5 respondents were covered in the survey, 2 men and 3 women Three persons were 40 years and older. Four persons have lived in the community for more than 20 years.

5.7.5.2 MAIN FINDINGS

5.7.5.2.1 OPINIONS ON THE COMMUNITY

- A quiet area with friendly people was the reasons the residents gave for liking the community.
- Unemployment and poor roads were the reasons for not liking it.
- Only 1 resident saw “large scale development as beneficial to the community”. Job opportunities were seen as the primary reasons for this view

5.7.5.2.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- None of the 5 persons was aware of the existence of bauxite or alumina processing plant operations in the area and as a result none reported any impacts, negative or positive, on themselves or the community.

5.7.5.2.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- Two (2) of the 5 persons interviewed were aware of the Development Plan, but only 1 thought the impact on the economic value of the community and on job opportunities would be positive. The others did not know.
- With regard to the impact on pollution, only 1 person saw it as positive and 1 saw it as negative.

- The 2 persons were not sure if the upgrade would affect them personally but they were of the opinion that more job opportunities would result from the upgrade activity.

5.7.5.2.4 AVAILABILITY OF WATER

- Three (3) of the 5 obtained water from the public standpipe and 2 used rainwater.
- As regards water safety, there were 2 respondents indicating that the water was safe to drink. This was so, they felt, because the water looks and or smells clean as indicated by 9 responses.

5.7.5.2.5 AWARENESS AND SOLUTIONS

- No one had ever voiced an opinion on the subject of pollution.
- Four (4) persons said they were satisfied with efforts to deal with the health problems in the community.
- No one had ever received compensation for pollution
- No one person reported having worked in the bauxite industry.
- No one indicated an awareness of programs or activities initiated by JAMALCO.
- Not being aware of the pollution and health issues usually related to bauxite operations the residents of Halifax had no ready solutions.

5.7.6 MALTON

5.7.6.1 THE SURVEY POPULATION

A total of 14 respondents were covered in the survey, 11 men and 3 women. One (1) woman was under 20 years and 3 were 60 years and older. Thirteen persons have lived in the community for more than 20 years.

5.7.6.2 MAIN FINDINGS

5.7.6.2.1 OPINIONS ON THE COMMUNITY

- There were 14 responses stating the 'quietness' of the community as the main reason for liking it and 12 stating 'friendly people.
- Unemployment (13) and lack of utilities (10) were the main reasons given for not liking the community.
- Eleven of the 14 residents interviewed saw "large scale development as beneficial to the community". Job opportunities and the potential for development of skills were seen as the primary reasons for this view

5.7.6.2.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- Nine (9) persons said that they were aware of the existence of bauxite or alumina processing plant operations in the area and all 9 of them said that they had not experienced any negative impacts from the operations.
- Only 2 persons agreed that the bauxite facility has had negative impacts on the people in the community. They gave no reasons for their opinion
- Seven (7) of the 9 respondents agreed that the bauxite facility has had positive impacts on the people in the community mainly because of the educational and social benefits.

5.7.6.2.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- Nine (9) of the 14 persons interviewed were aware of the Development Plan. All thought the impact on the economic value of the community and on job opportunities would be positive.

- With regard to the impact on pollution, only 1 person saw it as positive, 2 saw it as negative,2 saw no change and 4 did not know.

- Five (5) persons felt the upgrade will affect them personally.

- The responses to the question on the main impact overall of the proposed upgrade suggested positive as well as negative factors. The prospects of job opportunities emerged as the main impact with 9 responses. More dust circulating in the area (6) and contamination of water supplies (4) represented the negative responses.

- As reasons for the particular answers given, 5 stated that more jobs would be available and 2 said 'the present mining causes this (dust), so it can only get worse.

5.7.6.2.4 AVAILABILITY OF WATER

- All 14 respondents have access to rainwater through the use of tank or drum.

- On the issue of water safety, there were 12 respondents indicating that the water was safe to drink. This was so because the water looks and or smells clean as indicated by 9 responses.

5.7.6.2.5 AWARENESS AND SOLUTIONS

- Five (5) of the 14 respondents stated that they had voiced an opinion on the pollution problem.
- Only 3 persons said they were satisfied with efforts to deal with the health problems in the community.
- No one had ever received compensation for pollution
- Only 1 person reported having worked in the bauxite industry.
- Only 1 of the 14 respondents indicated an awareness of programs or activities initiated by JAMALCO.
- Nine (9) responses indicated no knowledge or some uncertainty of what should be done about the pollution problem or did not respond, and 3 said there is nothing that can be done. Four (4) responses stated that pollution was not a problem in that area.
- In relation to the health problems, the responses were as follows; provide free/partially funded healthcare (5); build/expand clinic (5).

5.7.7 GROVE PLACE

5.7.7.1 THE SURVEY POPULATION

A total of 14 respondents were covered in the survey, 9 men and 5 women. Eight persons were under 40 years. A half of the respondents have lived in their community for more than 20 years.

5.7.7.2 MAIN FINDINGS

5.7.7.2.1 OPINIONS ON THE COMMUNITY

- The 14 persons reported that they liked the community because it was quiet and there were 9 responses for' friendly people'.

- Unemployment (15) and lack of utilities (8) were the main reasons given for not liking the community.

- Twelve of the 14 residents interviewed saw "large scale development as beneficial to the community". Job opportunities and the potential for development of skills were seen as the primary reasons for this view.

5.7.7.2.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- Eleven (11) persons said that they were aware of the existence of bauxite or alumina processing plant operations in the area and 7 of them said that they had experienced negative impacts from the operations.

- The 7 who reported that the operations had impacted negatively on them identified dust and damage to property as the factors affecting them.

- As many persons (5) said that there have been negative impacts on the community as said that there was none. The reasons given were that, the area has widespread corrosion, the area smells of caustic soda and people often get sick.

- Ten of the 14 respondents agreed that the bauxite facility has had positive impacts on the people in the community mainly because of the job opportunities and improved community relations.

5.7.7.2.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- Six of the 14 persons interviewed were aware of the Development Plan, and all 6 saw the impact on the economic value of the community and on job opportunities as positive.

- With regard to the impact on pollution, 1 persons saw it as positive, 1 saw it as negative, 1 saw no change and 2 did not know.

- Only 1 person felt that the upgrade would have personal effects.

- While the responses to the question on the main impact overall of the proposed upgrade, suggested the availability of job opportunities, 'more dust circulating in the area' an 'contamination of water supplies', were also identified as likely impacts.

5.7.7.2.4 AVAILABILITY OF WATER

- Rainwater through the use of tanks and drums was the main source of drinking water for the community. No one reported access to piped water.

- As regards water safety, 8 respondents indicated that the water was safe to drink while 4 said it was not and 2 were not sure. It is seen as safe because it is tested frequently by the NWC and it looks and smells clean. It is seen as not safe because and bauxite mining affects water (1).

5.7.7.2.5 AWARENESS AND SOLUTIONS

- Only 5 of the 14 respondents stated that they had ever voiced an opinion on the pollution problem.

- Most persons (10) said they were not satisfied with efforts to deal with the health problems in the community.

- Three (3) persons had received compensation for pollution.

- Nine (9) persons reported that they or members of their household had worked in the bauxite industry.

- Only 1 of the 14 respondents indicated an awareness of programs or activities initiated by JAMALCO.

- As much as 9 responses indicated no knowledge or some uncertainty of what should be done about the pollution problem or did not respond. Two (2) responses suggested that the bauxite emissions should be controlled/ reduced and the air filtered.

- In relation to the health problems, the responses were as follows; provide free/partially funded healthcare (4); build/expand clinic (4).

5.7.8 GREEN VALE

5.7.8.1 THE SURVEY POPULATION

A total of 14 respondents were covered in the survey, 9 men and 5 women. Nine persons were under 50 years. A half of the respondents have lived in their community for more than 20 years.

5.7.8.2 MAIN FINDINGS

5.7.8.2.1 OPINIONS ON THE COMMUNITY

- Ten persons reported that they liked the community because it was quiet; there were 7 responses each for friendly people and a clean environment.

- Unemployment (10) and lack of utilities (8) were the main reasons given for not liking the community.

- Twelve of the 14 residents interviewed saw “large scale development as beneficial to the community”. Job opportunities and the potential for development of skills were seen as the primary reasons for this view

5.7.8.2.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- Ten (10) persons said that they were aware of the existence of bauxite or alumina processing plant operations in the area and 6 of them said that they had not experienced any negative impacts from the operations.

- The 4 who reported that the operations had impacted negatively on them identified damage to property and dust as the factors affecting them.

- Three (3) persons expressed the view that the bauxite facility has had negative impacts on the people in the community. Widespread corrosion and the smell of caustic soda were the impacts identified.

- Eight (8) of the 14 respondents agreed that the bauxite facility has had positive impacts on the people in the community mainly because of the job opportunities and the improved community relations.

5.7.8.2.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- Six of the 14 persons interviewed were aware of the Development Plan, and all 6 saw the impact on the economic value of the community and on job opportunities as positive.

- With regard to the impact on pollution, 3 persons saw it as positive, 1 saw it as negative and 1did not know.

- While 3 of the 6 persons felt the upgrade would affect them personally, felt it would not.

- The responses to the question on the main impact overall of the proposed upgrade reported the prospects of job opportunities and better community relations to be the main outcomes.

5.7.8.2.4 AVAILABILITY OF WATER

- Rainwater through the use of tanks and drums was the main source of drinking water for the community. Only 1 person reported access to piped water for which the National Water Commission was the original supplier.

- As regards water safety, 4 respondents indicated that the water was safe to drink while 6 said it was not and 4 were not sure. It is seen as not safe because bauxite mining and other sources affect the water (3) and because it is not piped water (2). It is seen as safe because it is tested frequently by the NWC, it looks and smells clean and the tanks are kept covered.

5.7.8.2.5 AWARENESS AND SOLUTIONS

- Only 4 of the 14 respondents stated that they had ever voiced an opinion on the pollution problem.
- Only 3 of the 14 persons said they were not satisfied with efforts to deal with the health problems in the community.
- No one had ever received compensation for pollution
- Six (6) persons reported that they or members of their household had worked in the bauxite industry.
- Only 4 of the 14 respondents indicated an awareness of programs or activities initiated by JAMALCO.
- All 14 respondents indicated no knowledge or some uncertainty of what should be done about the pollution problem or did not respond.
- In relation to the health problems, the responses were as follows; provide free/partially funded healthcare (2); build/expand clinic (9).

5.7.9 BALLYNURE

5.7.9.1 THE SURVEY POPULATION

A total of 17 respondents were covered in the survey, 13 men and 4 women . Nine of the 17 were between the ages of 20 and 39 years and 15 persons had lived in the community for more than 10 years.

5.7.9.2 MAIN FINDINGS

5.7.9.2.1 OPINIONS ON THE COMMUNITY

- Friendly people, a clean environment and availability of farmland were identified as the main reasons for liking the community.
- Poor roads and a lack of utilities were the main reasons given for not liking the community.
- Fourteen of the 17 residents interviewed saw “large scale development as beneficial to the community”. Job opportunities and the potential for development of skills were seen as the primary reasons for this view

5.7.9.2.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- Eleven (11) persons said that they were aware of the existence of bauxite or alumina processing plant operations in the area but only 2 reported that they had experienced negative impacts from the operations.
- Dust, soot and gaseous emissions and damage to property were identified as the factors affecting them.
- Only 1 person felt that the bauxite facility has had negative impacts on the people in the community because ‘you get sick more often’.
- The other respondents agreed that the bauxite facility has had positive impacts on the people in the community mainly because of the job opportunities.

5.7.9.2.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- Eleven (11) of the 17 persons interviewed were aware of the Development Plan. All thought the impact on the economic value of the community and on job opportunities would be positive.

- With regard to the impact on pollution only 1 person said it would be positive. Among the others, 3 persons saw it as negative, 2 saw no change. And 5 did not know.

- Five (5) persons felt the upgrade would affect them personally.

- The responses to the question on the main impact overall of the proposed upgrade suggested positive as well as negative factors. There were increased population (9); job opportunities (7); better community relations (7); and more air pollution and noise (4) were seen as the consequences of the upgrade.

5.7.9.2.4 AVAILABILITY OF WATER

- Rainwater through the use of tanks and drums was the main source of drinking water for the community. Only 1 person reported access to piped water which had been provided through private arrangements.

- As regards water safety, 10 respondents indicated that the water was safe to drink while 6 said it was not. It is seen as safe mainly because it looks and smells clean and to a lesser extent because the tanks are kept closed and clean. It is seen as not safe because bauxite mining and other sources affect water.

5.7.9.2.5 AWARENESS AND SOLUTIONS

- Only 4 of the 17 respondents stated that they had voiced an opinion on the pollution problem.
- Seven (7) of the 17 persons said they were not satisfied with efforts to deal with the health problems in the community.
- One (1) person had received compensation for pollution
- Three (3) persons reported having worked in the bauxite industry.
- Two (2) persons indicated an awareness of programs or activities initiated by JAMALCO.
- While there were 13 responses indicating no knowledge or some uncertainty of what should be done about the pollution problem, 2 suggested providing a better water supply system and the covering of tanks in the area.
- In relation to the health problems, the responses were as follows; provide free/partially-funded healthcare (5); build/expand clinic (3).

5.7.10 DEVON

5.7.10.1 THE SURVEY POPULATION

The survey covered 3 male respondents between the ages of 20 and 49 years. older and had all lived in the community for more than 20 years, who have been residents of the community for more than 6 years.

5.7.10.2 MAIN FINDINGS

5.7.10.2.1 OPINIONS ON THE COMMUNITY

- A quiet area with friendly people and available farmland were the reasons the residents gave for liking the community.
- Poor roads was reported as the reason for not liking it.
- Only 1 resident saw “large scale development as beneficial to the community”. The offers of skill development were seen as the primary reasons for this view

5.7.10.2.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- Two (2) of the 3 persons were aware of the existence of bauxite or alumina processing plant operations in the area but none reported any positive or negative impacts, on themselves or the community.

5.7.10.2.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- None of the 3 persons interviewed was aware of the Development Plan and how it could impact on of the community.

5.7.10.2.4 AVAILABILITY OF WATER

- Two (2) of the 3 respondents obtained water from the public standpipe and 1 used rainwater.
- As regards water safety, there were 2 respondents indicating that the water was safe to drink. This was so, they felt, because the water looks and or smells clean.

5.7.10.2.5 AWARENESS AND SOLUTIONS

- One person reported ever voicing an opinion on the subject of pollution.
- One (1) person expressed satisfaction with efforts to deal with the health problems in the community.
- No one had ever received compensation for pollution
- One (1) person reported having worked in the bauxite industry.
- No one indicated an awareness of programs or activities initiated by JAMALCO.
- For solutions to the pollution problem the Devon respondents suggested that the bauxite emissions should be controlled/reduced and the air filtered. The suggested solution to the health problems was 'provide free/partially funded healthcare'.

5.7.11 RACE COURSE/OXFORD LAND SETTLEMENT

5.7.11.1 THE SURVEY POPULATION

A total of 5 respondents were covered in the survey, 4 men and 1 women ranging between 20 and 59 years. Four persons have lived in the community for more than 20 years.

5.7.12 MAIN FINDINGS

5.7.12.1.1 OPINIONS ON THE COMMUNITY

- A quiet area with friendly people and available farmlands were the reasons the residents gave for liking the community.
- Poor roads was the main reason given for not liking the community.

- The residents were equally divided on the impact of large scale development. Two saw it as positive and 2 as negative. The fifth person did not respond.. Job opportunities were seen as the primary reasons for the positive view. No clear reason was given for the opposite view.

5.7.12.1.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- None of the 5 persons was aware of the existence of bauxite or alumina processing plant operations in the area and as a result none reported any impacts, negative or positive, on themselves or the community.

5.7.12.1.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- Two (2) of the 5 persons interviewed were aware of the Development Plan, and they thought the impact on the economic value of the community and on job opportunities would be positive.

- With regard to the impact on pollution, 1 person saw it as positive and 1 saw it as negative.

- One of the 2 persons said there would be effects from the upgrade while the other respondent was not sure. They were of the opinion however that more job opportunities would result from the upgrade activity.

5.7.12.1.4 AVAILABILITY OF WATER

- Two (3) of the 5 persons had access to indoor piped water, originally supplied by the National Water Commission and the rest used rainwater.

- As regards water safety, all 5 respondents indicated that the water was safe to drink. This was so, they felt, because the water looks and or smells clean and was frequently tested by the National Water Commission.

5.7.12.1.5 AWARENESS AND SOLUTIONS

- No one had ever voiced an opinion on the subject of pollution.
- Three (3) persons said they were satisfied with efforts to deal with the health problems in the community and there was no response from the others.
- No one had ever received compensation for pollution
- No one person reported having worked in the bauxite industry.
- One person indicated an awareness of programs or activities initiated by JAMALCO.
- Not being aware of the pollution issues usually related to bauxite operations the residents of Race Course/Oxford Land Settlement had no ready solutions. For health problems they did suggest as solutions: compensation for residents (1); provide free/partially-funded healthcare (1); build/expand clinic (1).

5.7.13 TICKY TICKY

5.7.13.1 THE SURVEY POPULATION

A total of 3 respondents were covered in the survey, 1 man and 2 women They were all 40 years and older and had all lived in the community for more than 20 years.

5.7.13.2 MAIN FINDINGS

5.7.13.2.1 OPINIONS ON THE COMMUNITY

- A quiet area with friendly people was the reason the residents gave for liking the community.
- Unemployment and lack of utilities were the reasons for not liking it.

- Only 1 resident saw “large scale development as beneficial to the community”. Job opportunities and the offers of skill development were seen as the primary reasons for this view.

5.7.13.2.2 AWARENESS AND OPINIONS ON EXISTING BAUXITE OPERATIONS

- All 3 persons were aware of the existence of bauxite or alumina processing plant operations in the area but none reported any negative impacts, on themselves or the community. On the other hand, they saw positive effects in the form of job opportunities.

5.7.13.2.3 KNOWLEDGE AND VIEWS ON DEVELOPMENT PLAN

- Only 1 of the 3 persons interviewed was aware of the Development Plan, and thought the impact on the economic value of the community and on job opportunities would be positive.

- With regard to the impact on pollution, the 1 person did not know.

- The 1 person was not sure if the upgrade would affect him/her personally but they was of the opinion that more job opportunities would result from the upgrade activity.

5.7.13.2.4 AVAILABILITY OF WATER

- Two (2) of the 3 respondents had access to water piped indoors and 1 used rainwater from a tank or drum. The piped water was supplied originally through private arrangements by the respondent.

- As regards water safety, there were 2 respondents indicating that the water was safe to drink. This was so, they felt, because the water looks and or smells clean and the tanks are covered and cleaned..

5.7.13.2.5 AWARENESS AND SOLUTIONS

- No one had ever voiced an opinion on the subject of pollution.
- Two (2) persons said they were satisfied with efforts to deal with the health problems in the community.
- No one had ever received compensation for pollution
- No one person reported having worked in the bauxite industry.
- One (1) person indicated an awareness of programs or activities initiated by JAMALCO.
- Not being aware of the pollution issues usually related to bauxite operations the residents of Ticky Ticky had no ready solutions. With regard to problems of health, there were 2 responses for: provide free/partially funded healthcare.

5.8 DETAILS OF THE FOLLOW-UP CONSULTATION IN NORTH MANCHESTER

Issues related to the following have come out as major concerns to those who participated in the consultation. In some cases the concerns remain the same, but in other cases new concerns are evident. Major concerns are:

- Supply of potable water to communities
- Sources of dust and methods to deal with it
- Truck Traffic through communities
- Loss of use of land and possible relocation (both homes and farms)
- Communication with the community and authorities
- Economic situations related to repayment for inconveniences caused and access to trucking jobs

Questions asked and answers provided are included in the report as Appendix IV: Survey Instrument.

IDENTIFICATION AND ANALYSIS OF ALTERNATIVES

6 IDENTIFICATION AND ANALYSIS OF ALTERNATIVES

6.1 ANALYSIS OF ALTERNATIVES

6.1.1 MINING ALTERNATIVES

6.1.2 NO ACTION ALTERNATIVE

With the "No Action" Alternative, the situation would be grave for Jamalco and the economy of local communities the operations service and ultimately, that of Jamaica. Based on the available reserves and quality of bauxite available to Jamalco at this time, the plant cannot operate much beyond early 2006 without having to cease operations. The plans for expansion of Jamalco's operations would have to be put on hold.

The ore from North Manchester is needed for blending with that being mined in areas of South Manchester to improve the stock quality and the efficiency of the plant. If nothing is done the limited resources left in South Manchester will quickly be depleted and the operation will have to source bauxite elsewhere, or shutdown.

Jamaica would miss the opportunity for the major expansion investment of over US$1.25B (the single largest investment in its history) of which US$300M would go towards purchasing Jamaican goods and services and additional income to the country of US$77M per year, the loss of approximately 200 permanent jobs (from mining activities alone) and and approximately 2,500 temporary jobs during construction.

6.1.2.1 MINE BAUXITE FROM AREAS OTHER THAN AREAS PROPOSED

This may be impractical at this time since mining areas are determined by location of bauxite deposits suitable for processing in the plant and leases/licenses that require lengthy processing and negotiation periods. Additionally, much of the lands identified in SEPL 530 are government lands, zoned and reserved for the purpose of bauxite mining.

6.1.2.2 MINE BAUXITE IN SEPL 530 AS PROPOSED

This is the preferred alternative.

Jamalco already has permission to mine bauxite in this area and much of the land is government owned and has been set aside for the purpose of bauxite mining. Additionally, the ore is of a quality that is complementary of that currently being mined by Jamalco in areas of South Manchester. It has been found that when blended, the two ore types make a better feed stock for the refinery and results in improved efficiency and product quality. Implementation of this alternative will also provide the planners of the expansion of the plant, the level of comfort that comes from knowing that suitable ore will be available for the expanded operations.

Many of the communities within SEPL 530 are centralized with a low ratio of homes located in prime bauxite deposits. Notwithstanding, there may be the need for relocation. With the low impact mining operations planned for the area, Jamalco will be able to mine the bauxite and rehabilitate these areas quickly so that they will be available for future growth and development of these communities.

6.1.3 TRANSPORTATION ALTERNATIVES

6.1.3.1 USE CONVEYORS TO TRANSPORT ORE TO ST. JAGO

Possible alternative, however, this would involve significant cost, major land acquisition, environmental and socio-economic concerns since the conveyor would have to extend for approximately 25 miles. This alternative would not reduce, but increase the number of trucks that will be necessary to move bauxite ore temporarily from the mines to St. Jago as the conveyor system would take several years to complete. This would also exclude members of the community from realizing additional benefits from the mines, since transportation by trucks usually involves small independent contractors sourced locally.

6.1.3.2 USE TRUCKS BETWEEN MINES AND ST. JAGO

This is a possible alternative, however, it is anticipated that mining will be ongoing in the North Manchester area for some time and it is impractical or would require significant investment in the infrastructure to maintain roadways and limit the impacts to community residents for such an extended period. The number of trucks that would have to be on the road on a daily basis to supply the full daily bauxite requirement for the upgraded refinery would be impractical.

For the short duration proposed as a temporary measure to test the bauxite from North Manchester at the refinery while the rail lines are improved, 10 trucks will be utilised to transport less than 10% of the required bauxite for an 18 month period. During this time, necessary upgrades can be made and maintained in an effort to keep the supply of ore consistent and of a useful quality going into the plant. When compared with the option of rail delivery of the bauxite it is quite evident that trucking is the lesser of the two alternatives, by far.

6.1.3.3 EXTEND RAIL LINES BETWEEN MINES AND ST. JAGO

This is the preferred transportation alternative for the following reasons:

- Allows for the revitalization of the abandoned JRC railway corridor
- Most cost effective and comprehensive solution to the issues related to transportation of bauxite as it minimises or eliminates most of the potential negative impacts on the communities and environment.
- Moves large quantities of ore in less time and at less cost than trucking
- Through proper training and monitoring issues related to noise and vibration can be minimised as operators will have protocols and procedures that they must follow.

6.1.3.4 ALTERNATIVES FOR TEMPORARY TRUCKING OF BAUXITE

Based on the anticipated bauxite demand for the Jamalco Refinery for 2006, the need to maintain a consistent grade of bauxite for processing, and the quality and availability of bauxite from its two available mining areas (North and South Manchester), plant engineers have estimated that 25% of the total demand for the year must come from the North Manchester mining area.

This means that approximately 1.3 Mt/year of bauxite would be required from the North Manchester mines. It is acknowledged that the railroad being rehabilitated and upgraded as the main means of transportation for the ore will not be ready for at least 18 months from the start of mining. Therefore, temporary trucking solutions must be identified to keep the bauxite plant operational.

Jamalco understands the impacts associated with the use of trucks to move bauxite from mine to plant and in a concessionary mitigation move have made adjustments in their production and operational plans for the anticipated 18 month period to minimize the number of trucks on the road, their frequency and thus the associated impacts.

The decision has been taken to limit the introduction of bauxite from North Manchester to a “test” amount (260,000 tonnes/year) to allow plant operators and engineers to prepare the refinery for the material when it is fully introduced after 18 months. As a result the following is proposed:

- 10 trucks will be used to haul bauxite from mines
- Each truck will make 4 trips per day, 5 days per week
- Truck will not be dispatched during peak hours
- Each truck will haul approximately 25 tonnes of bauxite per trip
- This represents a reduction from the required demand of 80%.

The transportation alternatives reviewed are:

1. **Through Mile Gully to Plant in Halse Hall**

   This alternative involves the loading of trucks in the mining areas, travel on haul roads to the Mile Gully main road. Trucks would then proceed southeast through Kirkvine to the Old Melrose Hill Road at the bottom of which they would turn left

onto the Porus main road and continue on to the Mineral Heights roundabout. At Mineral Heights the trucks would go south to the Jamalco refinery. This trip would cover approximately 56 km or 35 miles.

This is not the preferred alternative as it results in the longest time spent on the roadways. However, in the event of "special conditions" which warrant the movement of bauxite from the mining area directly to the plant in Halse Hall, this would be the option considered.

2. By-pass Mile Gully to Plant in Halse Hall

This alternative involves the loading of trucks in the mining areas, travel southeast on dedicated haul roads around the town of Mile Gully to Kirkvine. Trucks would proceed to the Old Melrose Hill Road at the bottom of which they would turn left onto the Porus main road and continue on to the Mineral Heights roundabout. At Mineral Heights the trucks would go south to the Jamalco refinery. This trip would cover approximately 56 km or 35 miles.

This is not the preferred alternative as it results in the longest time spent on the roadways and introduces the expensive option of constructing a road around Mile Gully that may not be necessary with the lower number of trucks and the 18 month timeframe.

3. By-pass Mile Gully to St. Jago Railhead

This alternative involves the loading of trucks in the mining areas, travel southeast on dedicated haul roads around the town of Mile Gully to Kirkvine. Trucks would proceed to the Old Melrose Hill Road at the bottom of which they would turn left onto the Porus main road and continue on to Toll Gate where the trucks will turn right and proceed to St. Jago. This trip would cover approximately 40 km or 25 miles.

This is not the preferred alternative. It introduces the expensive option of cutting a road around the town of Mile Gully that may not be needed with the low number of trucks and the 18 month timeframe.

4. Through Mile Gully turning prior to Porus to St. Jago Railhead

This alternative involves the loading of trucks in the mining areas, travel on haul roads to the Mile Gully main road. Trucks would then proceed southeast through Kirkvine to the Old Melrose Hill Road at the bottom of which they would turn left onto the Porus main road then turn right onto a parochial road (several choices are available) travel through various small districts to St. Jago. A series of parochial roads would be used and improvements made where necessary to gain access to St. Jago Railhead. This trip would cover approximately 45 km or 28 miles.

This is not the preferred alternative as it involves the potential for impacting on many more rural communities than the other alternatives. Additionally, parochial roads would have to be upgraded and in some cases widened to accommodate the truck traffic. This is the costliest of the alternatives reviewed and may add new impacts.

5. Through Mile Gully to St. Jago Railhead

This alternative involves the loading of trucks in the mining areas, travel on haul roads to the Mile Gully main road. Trucks would then proceed southeast through Kirkvine to the Old Melrose Hill Road at the bottom of which they would turn left onto the Porus main road and continue on to Toll Gate where the trucks will turn right and proceed to St. Jago. This trip would cover approximately 40 km or 25 miles.

This is the preferred temporary trucking alternative as it allows for the shortest time spent on the roadways and where possible utilizes roads with light traffic usage.

MEMORANDUM OF UNDERSTANDING BETWEEN JAMALCO AND FORESTRY DEPARTMENT OF JAMAICA

7 MEMORANDUM OF UNDERSTANDING BETWEEN JAMALCO AND FORESTRY DEPARTMENT OF JAMAICA

The purpose of this memorandum is to establish the framework for collaboration between the parties to carry out the successful reclamation and rehabilitation of certain mined-out lands via the reforestation and / or afforestation of these lands.

It seeks to address the concern of the Forestry department that the reduction and degradation of forests as a result of bauxite operations should be guided by the No-Net-Loss Policy which would result in the compensation for the loss of forest cover from one site via the reforestation of another area of equivalent proportion.

The MOU (Appendix VI) became effective on 29 August 2002 and has a tenure of 5 years.

The parties will review the Reforestation strategy after two years to determine whether the objectives are being met and whether the strategy needs to be reassessed.

Trees that have been selected for use in the programme are as follows:

- **ORNAMENTAL/ LUMBER TREES**
    - Cedar
    - Ficus
    - Acacia
    - Wild Tamarind
    - Blue Mahoe
    - Mahagony
    - Bitterwood
    - Bitter Damson

- Spanish Elm

- **FRUIT TREES**

  - Mango
  - Orange
  - Avocado
  - Breadfruit
  - Ackee

7.1.1.1 EMERGENCY RESPONSE

Jamalco has an excellent well documented procedure for handling emergency situations including natural disasters such as hurricanes, fires, earthquakes and the like. This includes an Early Warning System for responding to process emergencies and a 72 hour shut-down procedure if this becomes necessary.

For the mining operations, Jamalco will establish a nurses station at the loading station in Green Vale that will include an ambulance for quick transport of injured persons to a hospital facility should the need arise.

ENVIRONMENTAL MANAGEMENT AND TRAINING

8 ENVIRONMENTAL MONITORING AND MANAGEMENT PLAN

8.1 MONITORING PROGRAMME

In keeping with its Environmental Health and Safety policies as well as the legislation and regulations of the Government of Jamaica, Jamalco has an extensive Environmental Monitoring Programme which is carried out on all aspects of its operations.

In respect of Section 17 of the NRCA Act of 1991 the company is required to and submits the results of its Monitoring Programme to NEPA on a quarterly basis.

Among the parameters reported to NEPA are:

- raw materials used
- water quality
- effluent quality
- hazardous materials used
- water consumption
- fuel specifications
- materials and chemicals consumption. This category includes:
    - ♦ solvents
    - ♦ flocculants
    - ♦ oils and lubricants
    - ♦ acids
    - ♦ refrigerants

Jamalco also provides monthly monitoring and reporting to the Jamaica Bauxite Institute (JBI). In addition to the above named, ongoing monitoring activities, Jamalco will implement a monitoring programme at the new facilities, which will cover the pre-construction, construction and operations phases of the works there.

The objective is to insure that all potential impacts are realized and the appropriate mitigation actions are taken.

Monitoring will be done at regular intervals as follows:

1. The conditions of the sites and transportation corridors will again be inspected and recorded two weeks before construction start-up

2. At start-up of construction all activities will be monitored every two weeks for the first three months.

3. Monitoring will take every month from month four to month six.

4. Monitoring will take place quarterly until completion of construction i.e. from month seven to twenty four.

5. Monitoring will be on a monthly basis for three months during commissioning and start-up.

Monitoring reports will be prepared and submitted to NEPA for each monitoring interval for 1 to 5 above.

8.2 ENVIRONMENTAL MANAGEMENT

8.2.1 REHABILITATION

8.2.1.1 MOU WITH FORESTRY DEPARTMENT

Jamalco has signed a Memorandum of Understanding with the Forestry Department of the Ministry of Agriculture to facilitate collaborative activities between the parties in relation to the development and implementation of a "Land Care Management Plan" for segments of the mining area to govern the process of reclamation, rehabilitation and monitoring of mined out lands (and any others identified) in accordance with predetermined post mining land uses.

This MOU will see to the preservation of species for use in the rehabilitation of mined out areas. Plate 8-1 below shows the result from the successful and effective implementation Jamalco's rehabilitation programme.

PLATE 8-1: REHABILITATED BAUXITE MINES

This is discussed in detail and a copy of this historical collaboration is included in Appendix VI: Reforestation plan in Jamaica –Memorandum of understanding between Ministry of Agriculture- Forestry Department and Alcoa.

8.2.1.1.1 LAND ACQUISITION AND RESETTLEMENT

The Company has developed a comprehensive Land Acquisition and Resettlement program over the thirty years of operation on the island. The program continues to benefit from improved methodology and strategy in clearing mining lands while creating as minimal an impact on the existing social structure of the affected communities. In developing the North Manchester Resource areas the company's present thinking is to utilize available government owned lands as the first areas that would be mined, and to have a minimal impact on residents as possible. This presents two important opportunities to the future development of the area:

1. Minimal social disturbance as government lands are sparsely populated and in most cases free of any settlement(s).

2. Provision of suitable lands (after rehabilitation and certification) for resettlement of residents from other potential mining areas.

The company approaches this process with an open mind and as such, feels that residents must also have the option to exercise their right to choose where they would like to be resettled. For a more comprehensive overview of Jamalco's Land Acquisition and Resettlement methods please refer to the Jamalco publication "You and Jamalco©" (Jamalco 2000 – included as APPENDIX V). This represents an easy and simple guide for residents to understand the issues that will impact on their lives and what are their available options.

Jamalco is an ISO 14001 and ISO 9000 certified facility. Jamalco's ISO 14001 certification was issued by Det Norske Veritas (DNV) in November of 2002 and remains valid until November 2005. The associated Environmental Management System (EMS) is accredited by ANSI RAB.

The EMS covers Jamalco's operations and includes activities associated with the railway transportation system, the bauxite alumina refinery, plant waste storage and disposal sites and the port at Rocky Point.

In keeping with the mandates of its ISO 9000 quality certification, Jamalco abides by their Quality Policy, which states:

Jamalco is committed to being "The Alumina Supplier of Choice"

- "Jamalco will relentlessly pursue continual improvement in everything we do to:
- Consistently provide product that meets customer and other applicable requirements for quality
- Enhance customer satisfaction by consistently meeting and exceeding their expectations
- Be cost effective and remains competitive in the global market
- Operate in a safe and environmentally responsible manner"
- Excellence Through Quality

Jamalco has a highly qualified technical, administrative and support staff within its Environmental Management Department, many trained to the tertiary level. All employees within the Department report to the Manager, Environmental, Health & Safety, a senior manager in the company who in turn reports directly to the Managing Director.

All aspects of Jamalco's operations have an environmental management, health and safety component. Environmental Standard Operating Procedures, guidelines and instruction have been developed by Jamalco to govern operations in all areas. As a result, all technical and support staff have a responsibility to insure that they operate in a safe and responsible manner regardless of the task being undertaken.

Many aspects of environmental management at the facilities are monitored through the use of checklists, periodic reporting and internal audits. These provide timely indications as to the effectiveness of the procedures and provide indications as to the need for

changes where applicable. The monitoring and checks also inform process operations and controls.

8.2.2 TRAINING

Jamalco has a commitment to the improvement and advancement of all its employees. A major component of this commitment is the provision and facilitation of training for employees at all levels.

Specific to environmental management, Jamalco provides training in the following areas, which are designed to keep relevant employees and contractors informed and ensures competence in performing their duties. The training program achieves the following:

- Conformance with Jamalco's EH&S policy
- Identifies significant actual and potential impacts of their work
- Defines associated benefits of improved personal performance
- Identifies the roles and responsibilities in achieving conformance with the EMS
- Relays proper environmental operating procedures for managing environmental related aspects of their duties
- Reinforces Jamalco's policy that only properly trained and experienced individuals are allowed to work unsupervised

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ENVIRONMENTAL WASTE AND OCCUPATIONAL HEALTH AND SAFETY

9 ENVIRONMENTAL WASTE AND OCCUPATIONAL HEALTH AND SAFETY

9.1 RISK ASSESSMENT AND HUMAN HEALTH RISK

Four main categories of risk have been identified, which must be avoided or minimized for all aspects of the project. These are:

1. Natural Hazards
2. Manmade Hazards
3. Accidents
4. Structural Failure

The associated risks are described below and actions suggested for avoidance, minimization, prevention and solution are illustrated in the table below:

TABLE 9-1: Risks and their Preventative Actions

Category	Risk	Source	Prevention	Solution
Natural Hazards	Hurricane	Nature	None	Implement 72 hour shutdown procedure; coordinate with ODPEM
	Earthquake	Nature	None	Plant and facilities designed to withstand earthquakes greater than 7.0 on the Richter Scale
	Flood	Rainfall		Proper design, construction and maintenance
	Lightning	Nature	None	Lightning arrestors
Manmade Hazards	Fire	Various (electrical, mechanical, accidental)	Proper maintenance and monitoring	Employ state of the art fire fighting systems to control and extinguish
	Explosion	Various (explosive environment, human error)	Proper maintenance, instrumentation and fail-safe systems	Continual training, audits, testing and monitoring
	Equipment Failure	Various	Proper maintenance, instrumentation and fail-safe systems	Continual training, inspection, audits, testing and monitoring

Category	Risk	Source	Prevention	Solution
Accidents	Electrocution	Electrical contact	Training, education	Lock-out, tag-out procedures
	Contravening Safety Procedures	Ignorance, negligence	Training, supervision and audits	Educative discipline
	Falls	Structures	Training, education, with updates	Provision and use of proper equipment
	Suffocation	Confined/poorly ventilated Space	Training, following standard procedures	Adequate ventilation, buddy system, signage
	Spills	Vessels, pipeline	Implementation of Jamalco's spill management procedures	Implementation of Jamalco's spill management procedures
Structural Failure	Dike Failure	RDAs	Proper design and engineering	Inspection, corrective actions
	Impoundment Liner	RDAs	Proper design and engineering	Inspection, corrective actions

9.2 OCCUPATIONAL HEALTH AND SAFETY

9.2.1 JAMALCO'S OH&S POLICY

Jamalco's OH&S policy is based on the worldwide policy used by Alcoa at all their operations and as such is often more stringent in many respects than local OH&S requirements. All activities must be conducted in a safe manner with proper regard for the health of all concerned. No worker will be required to work in any area and to do any activity without adequate provisions being made to ensure that the health and safety of that worker is not compromised.

Jamalco has an organized, documented set of Standard Operating Procedures which govern employees actions as they perform tasks at the facility. These procedures provide definitions of unfamiliar terms, outlines required safety equipment necessary to undertake the activity, provides direction and instruction on proper handling and management of associated waste streams and record keeping guidelines. This approach to worker safety is universal within Alcoa and Jamalco.

9.2.2 DRAFT OCCUPATIONAL HEALTH AND SAFETY ACT 2003

The Occupational Health and Safety Act, 2003, which is in Draft form makes provision for a safe and healthy working environment for all working persons and to provide for matters incidental thereto or connected therewith.

The objects of the Act are as follows:

a. the prevention of injury and illness resulting from conditions at the workplace.

b. the protection of the safety and health of workers.

c. the promotion of safe and healthy workplaces.

As a good corporate citizen, Jamalco is committed to conducting its mining operation in a manner that complies with the requirements of this Act.

Some specific elements of these requirements are as follows:

- A joint committee of worker and management personnel shall be established at every workplace where twenty or more workers are regularly employed.
- An employer shall place in a conspicuous place in the workplace, a list containing the names and work locations of the members of the joint committee.
- Where fewer than twenty workers are regularly employed, the employer shall cause a safety and health representative to be selected.
- An employer shall make or cause to be made and maintain an inventory of all hazardous chemicals and hazardous physical agents that are present in the workplace.

- The employee shall make available to the workers the inventory of hazardous materials and pertinent Material Safety Data Sheets.

- Any worker who is likely to be exposed to hazardous chemical or physical agents must be provided with appropriate training and instruction.

- A worker has the right to refuse work if he has reasonable grounds for believing that his safety or health is endangered.

9.2.3 SOLID AND HAZARDOUS WASTE MANAGEMENT

The management of hazardous waste resulting from any aspect of the Mining Enterprise will be done in accordance with the Mining Regulations, 1991 of the Government of Jamaica as well as the applicable standards for Jamalco and the standards for Alcoa Operations worldwide. These include handling, segregation, storage and disposal considerations. If there are potentially toxic substances in the overburden and mine waste, they will be handled in such a way as to minimize the impact on rehabilitation and the surrounding areas.

The mining of bauxite and the processing of bauxite ore into alumina generates a wide variety of waste streams that must be properly handled and managed. Jamalco has very well defined procedures for the management of all waste streams generated at all its facilities.

Since the proposal for upgrade of the facility is one of “Brownsite” upgrade and no new or unfamiliar activities are proposed, the same time tested, high quality approach to waste collection, handling and management will be utilized. The following is an overview of how waste is managed at Jamalco presently and how it will continue to be managed after the upgrade.

9.2.3.1 SOLID WASTE MANAGEMENT

Solid waste generated from mining operations, typically includes, among other items:

- Used filters
- Empty drums
- Used oil
- Aerosol cans
- Garbage
- Medical waste
- Absorbents
- Office refuse
- Waste Rags
- Scrap Parts/Broken equipment

For each waste stream identified, there exists complete listing of tasks necessary for the collection, handling and management of that waste. The procedures identify sources of that particular waste stream, accumulation or storage locations and provides instruction on proper labeling, proper storage and individual responsibilities. The procedures are specific for all locations and are comprehensive. Where practical, some wastes are handled onsite through local garbage pickup. However, certain sensitive waste streams are collected, packaged and transported to the refinery for disposal at the landfill or otherwise. No classified hazardous wastes are anticipated at the mining operations.

PUBLIC INVOLVEMENT

10 PUBLIC INVOLVEMENT

10.1 INTRODUCTION

Jamalco has an established record of consultation and cooperation with the communities, settlements and residents who are stakeholders in the area. This process of ongoing contact through meetings and activities provides Jamalco with an opportunity to understand and work with the communities expectations of the community.

During communication with the community, Jamalco provides information to the residents on ongoing activities and initiatives and coordinates mutually accepted solutions to address areas of concern. Jamalco intends on continuing this level of communication and dialogue with the communities throughout their tenure in the area and beyond. To date, Jamalco has conducted various community consultations, have met with area leaders, politicians and various other stakeholders to identify community concerns and to determine possible solutions. This has led to improved relationships between the communities and Jamalco and also plans for implementation of solutions to their concerns. improved infrastructure (water supply and roads) and a new school in the community.

10.2 COMMUNITY CONTRIBUTIONS

Over the years, Jamalco has played a major role as a good corporate citizen in the various communities they conduct business. The company has been involved in the daily life and development of these communities in many ways and plans to do the same in North Manchester.

Already there has been discussions and plans are being put in place for the following:

- Provision of potable water to the communities
- Construction of a new school in the community
- Upgrading roadways
- Hiring of local truckers for hauling of bauxite
- Employment

10.3 COMMUNITY CONSULTATION ON MINING PROJECT

Jamalco has consulted with communities throughout Manchester to provide details and information on the proposed mining project. Information on the project has come to residents of the various communities through the comprehensive socio-economic survey conducted and at several meetings, some called by Jamalco and others by the community leadership to discuss the project. At meetings called by Jamalco, community members and stakeholders are briefed on the project, provided with information on the potential impacts and how the negative impacts will be mitigated. The residents and stakeholders are allowed to voice their concerns which are taken into consideration and addressed as appropriate.

At the June 23, 2005 meeting held at the Mile Gully Community Center, the following issues were raised as major concerns:

- Supply of water to the communities
- Traffic on roadways
- Dust from stockpiled soils
- Use/access to bauxite lands
- Employment

At the July 28, 2005 meeting held at the Mt. Oliphant Church of God, the following major issues were raised:

- Dust
- Land acquisition and compensation
- Relocation
- Employment
- Community benefits

All concerns raised are important to Jamalco and concerted effort is being made to address these concerns in keeping with Jamalco's corporate policy.

APPENDICES

APPENDIX I

APPENDIX I: APPROVED TERMS OF REFERENCE

JAMALCO NORTH MANCHESTER EIA

Conrad Douglas & Associates Limited has been retained to conduct the Environmental Impact Assessment for the proposed Jamalco mining and transportation activities in Northern Manchester.

Background

Jamalco is a 50/50 joint venture Alumina refining company owned by the Government of Jamaica and Alcoa Minerals of Jamaica LLC. The operations comprise the Clarendon Alumina Works refinery located in Halse Hall, Rocky Point Port Facilities, the Lands and Mining operations in Woodside and South Manchester respectively, and a Traffic office in Kingston.

Clarendon Alumina Works is currently a two-digester refinery with a production capacity of 1.27 million tonnes of alumina annually. Bauxite is currently mined in Harmons Valley, South Manchester and transported to the refinery via rail. Shipping facilities are located at Rocky Point and commodity movement between the refinery and the port is also via rail, which is operated by Jamalco. The operation currently employs approximately 600 persons and is managed by Alcoa Minerals of Jamaica for the joint venture.

Between the third quarter of 2005 and 2008 the facility will be upgraded to produce 2.8 million tonnes of alumina annually. The refining and port operations will be modified/expanded in order to facilitate this upgrade. The mining and residue handling operations will also be upgraded to meet the refinery's increase demand for bauxite and residue disposal storage space respectively.

Currently the 1.27 MTPA of smelter grade alumina is produced from 4.5 MTPA of bauxite, which is sourced solely from the mines in Harmons Valley. This bauxite is transported by trucks to the South Manchester rail head in St. Jago, from where the ore is thereafter transported by rail to the refinery.

It is expected that the Harmons deposits will be depleted in the third quarter of 2007, and as such bauxite will therefore be required from the South Manchester Plateau to be blended with bauxite from the North Manchester deposits to ensure that a consistent quality feed to the plant is maintained in order to ensure that production targets are met.

Recent laboratory test works done for the planned Jamalco Unit #3 expansion project have indicated that the North Manchester bauxite cannot be processed efficiently by itself as a result of the poor settling characteristics of the digested residue.

By blending bauxite from both North and South Manchester reserves, however, the settling properties have shown significant improvement. Other benefits have also been determined from the blended bauxite, in respect of higher levels of phosphorus pentoxide (P_2O_5), when compared with South Manchester bauxite alone, this directly translate to better processing and product quality.

Blended bauxite from the North and South Manchester reserves will therefore minimize undue disruptions to the refinery; allow the plant to meet its present production targets whilst gaining valuable knowledge for future processing operations.

Until the railroad upgrade phase of this project is completed, Jamalco proposes to transport approximately 1,000,000 CWT of bauxite from North Manchester along the public road from Mile Gully to the Clarendon Alumina Works refinery over a distance of approximately 45km. Transportation of bauxite will be done using 35 Ton capacity highway trucks.

Approximately 3km of roadway will be constructed to eliminate narrow sections and curves of the existing public roadway. This will reduce haul truck time on public road, thereby minimizing safety risk and haul distance to the refinery.

Haul roads of a narrower width (as a result of the planned usage of 35 Ton trucks as the transportation solution in the mining area) will also be constructed for this mine development project. These haul roads will provide access from the mines to the main rail head which is proposed to be located at Greenvale once the North Manchester Mine railroad system becomes operational.

Bauxite from the North Manchester mine area will be transported to the proposed loading station at Greenvale by trucks and thereafter further transported by rail to the CAW refinery. The existing rail system used by Jamalco will be extended and upgraded to facilitate service to and from the Greenvale loading station. In addition, the upgrade of the transportation corridor will include the existing Jamaica Railway Service (JRC) railroad.

The proposed Greenvale loading station will be designed with the appropriate amenities and facilities and will include; office buildings, canteen and change rooms capable of servicing 100 individuals at peak workforce, Mobile equipment service area, Fuel oil storage and dispensing area, parking areas, security posts, weather station, sewage disposal system among others.

The normal railroad operation proposed will be based on six (6) days per week, 24 hours per day operation.

TERMS OF REFERENCE FOR CONDUCTING THE ENVIRONMENTAL IMPACT ASSESSMENT FOR MINING IN NORTH MANCHESTER BY ***JAMALCO***

In the Environmental Impact Assessment Report, **Conrad Douglas & Associated Limited** will give full and detailed accounts in the following areas, during the pre-mining, mining and the operational phases of the project:

Description of the Project:

CD&A will:

a. Describe area proposed for bauxite mining operations, storage, services and amenities, transportation corridors and systems, in detail.

b. Detail the elements of the project, highlighting areas to be reserved for construction, areas to be preserved in their existing state as well as activities and features which will introduce risks or generate impact (negative and positive) on the environment.

c. Use maps, site plans, photographs and other graphic aids as appropriate. Include overall plan which will delineate mining areas, transportation corridors, load out stations and buffer zones.

d. Include information on location and general layout.

e. Describe proposed blasting operations in the mining areas and Jamalco's approaches and methodologies to guarantee public health, and safety.

f. Pre-mining, mining and post- mining plans inclusive of closure and rehabilitation plans.

Description of the Environment

CD&A will generate baseline data, which will be used to describe the study area in respect of the following:

i. Physical environment inclusive of geology, hydrology (include impact of the modification of the topography on the hydrology of the area of influence of the project).

a. Determination of storm water run-off, drainage patterns, effect on ground water and availability of potable water.

b. Assessment of methods for sediment control at the mines and rail head storage areas.

c. Water quality issues.

d. Climatic conditions and air quality in the area of influence, including particulate emissions from stationary and mobile sources, NOx, SOx, wind speed and direction, precipitation, relative humidity and ambient temperatures.

e. Noise levels at the undeveloped site and ambient noise in the area of influence.

f. Obvious sources of pollution existing and extent of contamination.

g. Availability of solid waste management facilities.

ii. Biological environment

a. Description of any flora or fauna in the sphere of influence of the proposed project with special emphasis on rare, endemic or endangered species.

b. As appropriate determine any micro-organisms and the existence of micro-habitats to obtain an accurate baseline assessment.

c. Species dependence, niche specificity, community structure, population dynamics, carrying capacity, species richness and evenness (measure of diversity)

iii. Socio-economic and cultural constraints

a. Present and projected population

b. Present and proposed land use

c. Planed development activities

d. Community structure

e. Employment

f. Distribution of income, goods and services

g. Recreation

h. Public health and safety

i. Cultural peculiarities

j. Aspirations and attitudes

k. Historical importance of the area

l. Public perception

m. Administration of questionnaires as appropriate.

2. Policy, Legislations and Regulations:

CD&A will outline all pertinent policies, regulations and standards in keeping with the nature of the project. The examination of the legislation will include at a minimum, legislation such as the NRCA Act of 1991, The Public Health Act of 1926, The Water Resources Guidelines, The Mining Act, The Wild Life Act, legislation from the Solid Waste Management Authority (SWMA), and as appropriate international conventions, protocols, treaties etc. The EIA should also consider Alcoa's Mining and Rehabilitation Standards.

3. Determination of Potential Impacts:

CD&A will identify any major environmental issues of concern and indicate their relative importance to the design of the project and the intended activities. We will also determine potential impacts as they are related to, but not limited to the following:

a. Change in drainage pattern

b. Flooding potential

c. Landscape impacts of excavation and construction

d. Loss of any natural features by construction activities

e. Pollution of surface and ground water

f. Solid waste disposal

g. Air pollution

h. Socio-economic and cultural impacts

i. Risk assessment / Emergency Response *(liaise with the Office of Disaster Preparedness and Emergency Management)*

j. Noise inclusive of the impact from blasting operations.

k. Comment on Soil pH in relation to the nature of the project

l. Waste disposal via recycling

m. Capacity and design parameters of proposed development

n. Distinguish between positive and negative impacts, direct and indirect, long term and immediate impacts.

o. Avoidable as well as irreversible impacts

p. Present project activities and impacts in matrix form, with separate matrix for pre and post mitigation scenarios.

4. Mitigation

CD&A will prepare guidelines for avoiding, as far as possible, any adverse impacts due to proposed activity at the site whilst utilizing existing environmental attributes for optimum development. Where possible, quantify and assign financial and economic values to impacts and mitigating methods.

5. Monitoring

CD&A will suggest a plan to monitor implementation of mitigatory or compensatory measures and project impacts during construction and operation. We will also

prepare an Environmental Management Plan for the long-term operations of the project area.

An outline of the monitoring program will be included in the EIA report and a detailed version will be submitted to NEPA after the granting of the permit and prior to the commencement of the proposed development. The monitoring program will include the following at a minimum:

- Introduction outlining the need for a monitoring program and the relevant specific provisions of the permit license granted.

- The activity being monitored and the parameters chosen to effectively carry out the exercise.
- The methodology to be employed and the frequency of monitoring.
- The sites being monitored, stating any outer boundary where no impact from the development is expected if stated by NEPA or other local Agencies.

- A summary of data collected, including tables and graphs where appropriate.

- Discussion of results with respect to the development in progress, highlighting any parameter(s), which exceeds the standard (s).

- Frequency of reporting to NEPA.

- Recommendations

- Appendices of data and photographs.

6. Analysis of Alternatives

We will examine alternatives to the project including the no-action alternative. Project alternatives will incorporate the use history of the overall area in which the proposed project is located and previous use of the site itself.

All findings will be presented in the EIA report, reflecting the headings in the body of the TOR, as well as other references. Twelve hard copies and an electronic copy of the report will be submitted to NEPA. It will include an appendix with items such as maps, site plans, the study team, photographs and other relevant information.

APPENDIX II

APPENDIX II: WATER QUALITY DATA

WATER QUALITY – VICTORIA TOWN WELL

Date	Temp	Conductivity microS/cm	pH [-]	Color Hazen	Turbidity NTU	TDS [mg/l]	TS [mg/l]	TSS [mg/l]	COD [mg/l]	Hardness [mgCaCO3/l]	Alkalinity [mgCaCO3/l]	Aluminium [mg/l]
9/27/1976			6.4	5	1	220				200	196	
9/30/1976		490	7.3	5	0.1	260				204	196	
5/18/1976		450	7.1	5	0.41	240				185	202	
5/16/1983		405.6	7.5		0.45	236	236		0.35	198	202	
8/13/1986		436.8	7.4	0	0.19	236	236		1	189	201	
9/6/1988		390	7.5	2.2	0.06	233	233		0.62	191	208	0.019
Aug-92	24	525	6.9					0		139	205	
12/16/1992		405	7.39	35	47	234				210	743	
12/17/1992		392	7.7	5	0.24	236				182	197	
12/18/1992		408	7.53	5	0.14	236				184	197	
8/16/1993		406			0.5	236				198	202	
12/22/1997	25.1	408	6.93								58	
7/7/1998	22	425(own meas.)				214(own meas.)					199	

Date	Calcium [mg/l]	Iron [mg/l]	Magnesium [mg/l]	Manganese [mg/l]	Potassium [mg/l]	Sodium [mg/l]	Total Iron [mg/l]	Bicarbonate [mg/l]	Carbonate [mg/l]	Chloride [mg/l]	Fluoride [mg/l]	Phosphate [mg/l]
9/27/1976	64				10	7	0.16			14	0.05	
9/30/1976	61				13	13	0.28			15		
5/18/1976	64		5.9				0.07	202	0	8		
5/16/1983	70.4		4.9	0	0.35	12.8				11.8		
8/13/1986	65.9		5.94	0	0.1	12.8	0.1			9.95	0	
9/6/1988	68		5.2	0	0.45	12.5	0.04			9.5	0.08	
Aug-92	50.4		3.3		0.4	9.5				3.8	0.2	**0.1**
12/16/1992	67		10.4		0.3	18.5	0.01	243	0	9.5	0.053	
12/17/1992	62		6.6		0.3	18	0.01	197	0	9.5	0.114	
12/18/1992	64		5.9		0.2	18	0.01	197	0	9.5	0.15	
8/16/1993	70		5		0.35	13		202	0	12		
12/22/1997	71.3		4.57		0.417	11.9	0.003			10.6		**0.024**
7/7/1998	52		5.6		0.6	10				24		

Date	Silica [mg/l]	Sulphate [mg/l]	Ammonia [mg/l NH_3-N]	Nitrate [mg/L]	Nitrite [mg/l]	FC MPN/100ml	TC MPN/100ml	Free CO2 [mg/l]	NaCl ratio	SAR	Salinity %	remarks
9/27/1976				**10.4**				0.01	0.50	0.24		
9/30/1976				**10.8**				0.02	0.87	0.46		
5/18/1976		60					23		0.00	#DIV/0!		
5/16/1983		1.9		**5.9**	0			12	1.08	0.40		NWC
8/13/1986	1.75	3.6		**6.2**	0			15	1.29	0.41		NWC
9/6/1988	2.5	1.8		**4.7**	0			12	1.32	0.39		NWC
Aug-92		3.8		**5.6**		0	2		2.50	0.35		CNS
12/16/1992		8.3		**5.3**			900		1.95	0.56		
12/17/1992		8		**5.5**			30		1.89	0.58		
12/18/1992		8.1		**5.5**			17		1.89	0.58		
8/16/1993		2		**6**					1.08	0.40		
12/22/1997	2.4	4.44		**6.31**						0.37	0.2	CNS
7/7/1998		2		**6.38**						0.35		SRC

WATER QUALITY DATA – EVERGREEN MILE GULLY WELL

Date	Temp	Conductivity microS/cm	pH [-]	TDS [mg/l]	Alkalinity [mgCaCO3/l]	Calcium [mg/l]	Iron [mg/l]	Magnesium [mg/l]
12/22/1997	26.6	430	7.23		115	68.9	0.022	13.8
7/1/1998	25	430(own meas.)		209(own meas.)	214	172		11.5

Date	Potassium [mg/l]	Sodium [mg/l]	Chloride [mg/l]	**Phosphate [mg/l]**	Silica [mg/l]	Sulphate [mg/l]	Ammonia [mg/l NH_3-N]	**Nitrate [mg/L]**
12/22/1997	0.408	3.72	6.99	**0.019**	1.83	3.1	0.001	**8.8**
7/1/1998	2	10				0		**8.58**

Date	Salinity %	remarks
12/22/1997	0.2	CNS
7/1/1998		SRC

APPENDIX III

APPENDIX III: TRAFFIC COUNT DATA

Intersection: Clarendon Park Main Rd (Bet. Train Line / Juicy Beef)
Date: August 25, 2005

TIME (From:)	TIME (To:)	Vehicles from Porus [North] (Car)	Vehicles from Porus [North] (L/Com)	Vehicles from Porus [North] (Bus)	Vehicles from Porus [North] (Truck)	Vehicles from Porus [North] (M/Bus)	Vehicles from Toll Gate [South] (Car)	Vehicles from Toll Gate [South] (L/Com)	Vehicles from Toll Gate [South] (Bus)	Vehicles from Toll Gate [South] (Truck)	Vehicles from Toll Gate [South] (M/Bus)
6:00	7:00	0	0	0	0	0	0	0	0	0	0
7:00	8:00	309	0	10	25	0	326	0	16	59	0
8:00	9:00	314	0	14	40	0	295	0	13	45	0
9:00	10:00	262	0	16	45	0	175	0	5	36	0
10:00	11:00	293	0	14	44	0	289	0	13	39	0
11:00	12:00	294	0	10	40	0	251	0	6	56	0
12:00	1:00	344	0	13	67	0	261	0	12	46	0
1:00	2:00	301	0	11	40	0	240	0	14	38	0
2:00	3:00	230	0	16	52	0	245	0	15	38	0
3:00	4:00	260	0	4	44	0	205	0	14	43	0
4:00	5:00	301	0	12	49	0	246	0	13	45	0
5:00	6:00	357	0	13	42	0	380	0	11	35	0
6:00	7:00	313	0	7	54	0	254	0	8	16	0
7:00	8:00	0	0	0	0	0	0	0	0	0	0

TOTAL NUMBER OF VEHICLES OBSERVED

	ARM			
CLASSIFICATION	**EAST**	**WEST**	**NORTH**	**SOUTH**
Car			3,578	3,167
L/Com				
Bus			140	140
Truck			542	496
M/Bus				
Total:			**4,260**	**3,803**

PERCENTAGE OF VEHICLES OBSERVED

	ARM			
CLASSIFICATION	**EAST**	**WEST**	**NORTH**	**SOUTH**
Car			84.0	83.3
L/Com				
Bus			3.3	3.7
Truck			12.7	13.0
M/Bus				

Intersection: Porus Main Rd (Trinity near Highway)
Date: August 24, 2005

TIME (From:)	TIME (To:)	Vehicles from Trinity [West] (Car)	Vehicles from Trinity [West] (L/Com)	Vehicles from Trinity [West] (Bus)	Vehicles from Trinity [West] (Truck)	Vehicles from Trinity [West] (M/Bus)	Vehicles from Porus [East] (Car)	Vehicles from Porus [East] (L/Com)	Vehicles from Porus [East] (Bus)	Vehicles from Porus [East] (Truck)	Vehicles from Porus [East] (M/Bus)
6:00	7:00	0	0	0	0	0	0	0	0	0	0
7:00	8:00	353	0	3	26	0	352	0	3	63	0
8:00	9:00	347	0	3	35	0	379	0	1	52	0
9:00	10:00	366	0	2	36	0	315	0	0	41	0
10:00	11:00	336	0	3	44	0	305	0	2	30	0
11:00	12:00	342	0	0	45	0	334	0	2	46	0
12:00	1:00	306	0	4	69	0	313	0	3	55	0
1:00	2:00	317	0	0	40	0	305	0	3	44	0
2:00	3:00	272	0	2	53	0	339	0	1	37	0
3:00	4:00	321	0	1	48	0	367	0	4	34	0
4:00	5:00	362	0	2	51	0	320	0	3	36	0
5:00	6:00	392	0	0	52	0	413	0	2	46	0
6:00	7:00	333	0	0	27	0	422	0	0	44	0
7:00	8:00	0	0	0	0	0	0	0	0	0	0

TOTAL NUMBER OF VEHICLES OBSERVED

	ARM			
CLASSIFICATION	**EAST**	**WEST**	**NORTH**	**SOUTH**
Car	4,164	4,047		
L/Com				
Bus	24	20		
Truck	528	526		
M/Bus				
Total:	**4,716**	**4,593**		

PERCENTAGE OF VEHICLES OBSERVED

	ARM			
CLASSIFICATION	**EAST**	**WEST**	**NORTH**	**SOUTH**
Car	88.3	88.1		
L/Com				
Bus	0.5	0.4		
Truck	11.2	11.5		
M/Bus				

Intersection: Williamsfield Main Rd (Before RBT)
Date: August 25, 2005

TIME (From:)	TIME (To:)	Vehicles from Williamsfield RBT [South] (Car)	Vehicles from Williamsfield RBT [South] (L/Com)	Vehicles from Williamsfield RBT [South] (Bus)	Vehicles from Williamsfield RBT [South] (Truck)	Vehicles from Williamsfield RBT [South] (M/Bus)	Vehicles from Shooters Hill Rd [North] (Car)	Vehicles from Shooters Hill Rd [North] (L/Com)	Vehicles from Shooters Hill Rd [North] (Bus)	Vehicles from Shooters Hill Rd [North] (Truck)	Vehicles from Shooters Hill Rd [North] (M/Bus)
6:00	7:00	0	0	0	0	0	0	0	0	0	0
7:00	8:00	288	0	0	19	0	201	0	0	10	0
8:00	9:00	240	0	0	19	0	199	0	0	18	0
9:00	10:00	151	0	0	13	0	128	0	0	11	0
10:00	11:00	132	0	0	13	0	125	0	0	23	0
11:00	12:00	127	0	0	15	0	132	0	0	21	0
12:00	1:00	143	0	0	24	0	183	0	0	19	0
1:00	2:00	167	0	0	18	0	142	0	1	18	0
2:00	3:00	145	0	1	17	0	116	0	0	21	0
3:00	4:00	160	0	2	22	0	160	0	0	22	0
4:00	5:00	153	0	0	19	0	250	0	1	24	0
5:00	6:00	228	0	0	20	0	162	0	0	12	0
6:00	7:00	234	0	0	11	0	193	0	0	10	0

TOTAL NUMBER OF VEHICLES OBSERVED

	ARM			
CLASSIFICATION	***EAST***	***WEST***	***NORTH***	***SOUTH***
Car			1,991	2,168
L/Com				
Bus			2	3
Truck			209	210
M/Bus				
Total:			2,202	2,381

PERCENTAGE OF VEHICLES OBSERVED

	ARM			
CLASSIFICATION	**EAST**	**WEST**	**NORTH**	**SOUTH**
Car			**90.4**	**91.1**
L/Com				
Bus			**0.1**	**0.1**
Truck			**9.5**	**8.8**
M/Bus				

APPENDIX IV

APPENDIX IV: SURVEY INSTRUMENT

Socio-Economic Survey for the Expansion of JAMALCO's Plant Operations, Port Facilities, and Mining Operations

Community Name _____ Community Code | | | | | |

SECTION 1
PERSONAL CHARACTERISTICS

1) Gender
   1. Male
   2. Female

2) Age Range
   1. Under 20
   2. 20 – 39
   3. 40 – 49
   4. 50 – 59
   5. 60 – over
   6. Not Stated/No Response

3) How many years have you been living in the community?
   1. 0 – 5 Years
   2. 6 – 10 Years
   3. 11 – 20 Years
   4. more than 20 Years
   5. Not Stated/No Response

SECTION 2
OPINIONS ON THE COMMUNITY

4) What do you like most about the community? ***ASK & WAIT FOR RESPONSE***
   1. Friendly people
   2. Clean environment:
   3. Availability of farmland
   4. Quiet
   5. No crime & violence
   6. Other, (specify)_____
   7. Not Stated/No Response

5) What don't you like about the community? ***ASK & WAIT FOR RESPONSE***

1. Poor roads
2. Lack of Utilities
3. Crime & violence
4. Unemployment
5. Dirty environment
6. Other, (specify)_____
7. Not Stated/No Response

6) "Large scale development is beneficial to this community " (e.g. construction activities, plant upgrades, mining operations, housing) Do you agree?
   1. Yes
   2. No
   3. Not Stated/No Response (Go to Q 8)

7) Why do you think so?
   1. Job opportunities
   2. It will reduce the peacefulness of the area
   3. Offers skills development
   4. Improves utilities
   5. It will affect environmental quality in a negative way
   6. Other (specify)
   7. Not Stated/No Response

SECTION 3
AWARENESS & OPINIONS ON EXISTING BAUXITE FACILITIES

8) Are you aware that there is bauxite mining or alumina processing plant operations in your area?
   1. Yes
   2. No (Go to Q 14)
   3. Not Stated/No Response

9) Are you experiencing any negative impacts from the bauxite operation or facility mentioned above?
   1. Yes
   2. No (Go to Q 11)
   3. Not Stated/No Response

10) If **YES ASK**: What is this negative impact?
   1. Odour
   2. Traffic
   3. Dust, soot or gaseous emission
   4. Noise
   5. Damage to your property
   6. Not Stated/No Response
   7. Other, (specify)_____

11) Would you say that the bauxite mining or processing facility has had negative impacts on the people in this community?

1. Yes
2. No (Go to Q 13)
3. Not Stated/No Response

12) If **YES, ASK** - WHY WOULD YOU SAY THAT?

1. The area has widespread corrosion
2. The area smells like caustic soda more often than not
3. You get sick more often
4. Plants are harder to grow
5. Too much noise
6. Other (specify)
7. Not Stated/No Response

13) Would you say that the existing bauxite mining and alumina processing facility have had a positive impact on this community?

1. Yes
2. No

14) What positive impacts do you think the bauxite mining and alumina processing facility has had on the community?

1. Improved community relations
2. Job opportunities
3. Educational and social benefits
4. Amenities – roads, lights, water supply
5. Environmental conditions
6. None of the above
7. Other (specify)_____
8. Not Stated/No Response

SECTION 4
KNOWLEDGE AND VIEWS ON UPGRADE PLANS

15) Are you aware that JAMALCO proposes to upgrade their existing bauxite mining operations and processing plant facilities in the near future?

1. Yes
2. No
3. Not Stated/No Response

16) What effect do you think the proposed upgrade of JAMALCO's bauxite mining operations and processing plant facilities in or near your area will have on the following:

Economic value of the community

1. Positive
2. Negative
3. No Change
4. Don't Know
5. Not Stated/No Response

Job Opportunities

1. Positive
2. Negative
3. No Change
4. Don't Know
5. Not Stated/No Response

Pollution

1. Positive
2. Negative
3. No Change
4. Don't Know
5. Not Stated/No Response

17) Do you think the proposed upgrade will affect you personally?

1. Yes
2. No
3. Don't Know/Not Sure
4. Not Stated/No Response

18) What do you think are the main impacts that the upgrade would have on the local environment?

1. More jobs
2. Loss of income
3. More dust circulating in the area
4. Less air pollution and noise
5. More air pollution and noise
6. Contamination of Water supplies
7. Better community relations
8. Improved water supply and other amenities
9. More occurrences of diseases that affect breathing
10. More crime in the community
11. Increased population
12. Don't know/Not Sure
13. Other (specify)
14. Not Stated/No Response

19) Why do you think so?

1. The present mining and processing facilities have caused this

already. So it can only get worse.
2. The upgrade will add new equipment that will be cleaner to operate
3. More jobs will be available
4. This is something common to all bauxite operations
5. The upgrade will cause more people to pass through the community. So it gives more opportunity for crime
6. This is something that someone told me
7. Don't Know/Not Sure
8. Other (specify)
9. Not Stated/No Response

SECTION 5
AVAILABILITY OF WATER

20) What is your main source of drinking water?

1. Indoor tap/pipe
2. Outdoor private tap/pipe
3. Public standpipe
4. Spring, pond, river
5. Rainwater (tank or drum)
6. Trucked water (NWC)
7. Other (specify)
8. Not Stated/No Response

21) If you have piped running water in or around your household, who supplied it originally?

1. National Water Commission
2. JAMALCO
3. Other (specify)
4. Don't Know
5. Not Stated/No Response

22) "In this community, I think that we have access to safe water to drink" Do you agree?

1. Yes
2. No
3. Don't Know/Not Sure
4. Not Stated/No Response

23)WHY DO YOU THINK SO?

1. bauxite mining or processing operations affect the drinking water
2. Sources (not bauxite mining or alumina processing related) affect the drinking water quality
3. The water is tested frequently by the N.W.C.
4. The water looks and/or smells clean

5. Other, please specify
6. Not Stated/No Response

24) Have you or anyone in your household, received compensation for any pollution problems?

1. Yes
2. No
3. Don't Know
4. Not Stated/No Response

25) Have you or any member of your household ever worked for a bauxite company or in the bauxite industry?

1. Yes
2. No
3. Don't Know/Unsure
4. Not Stated/No Response

26) Are you aware of any programs or activities initiated by Jamalco in your community?

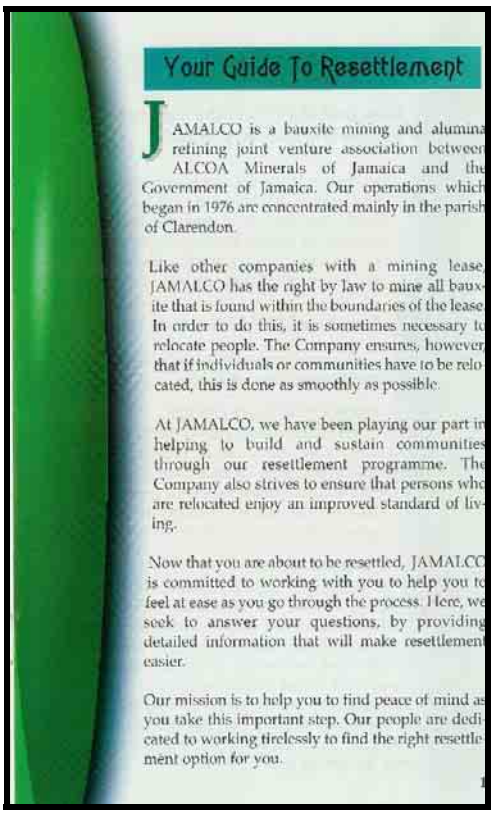
1. Yes
2. No
3. Don't Know/Unsure
4. Not Stated/No Response

THANK YOU
END OF INTERVIEW

Name of Interviewer:
Date of Interview:

APPENDIX V

APPENDIX V: 'JAMALCO AND YOU' Q & A BOOKLET



Your Guide To Resettlement

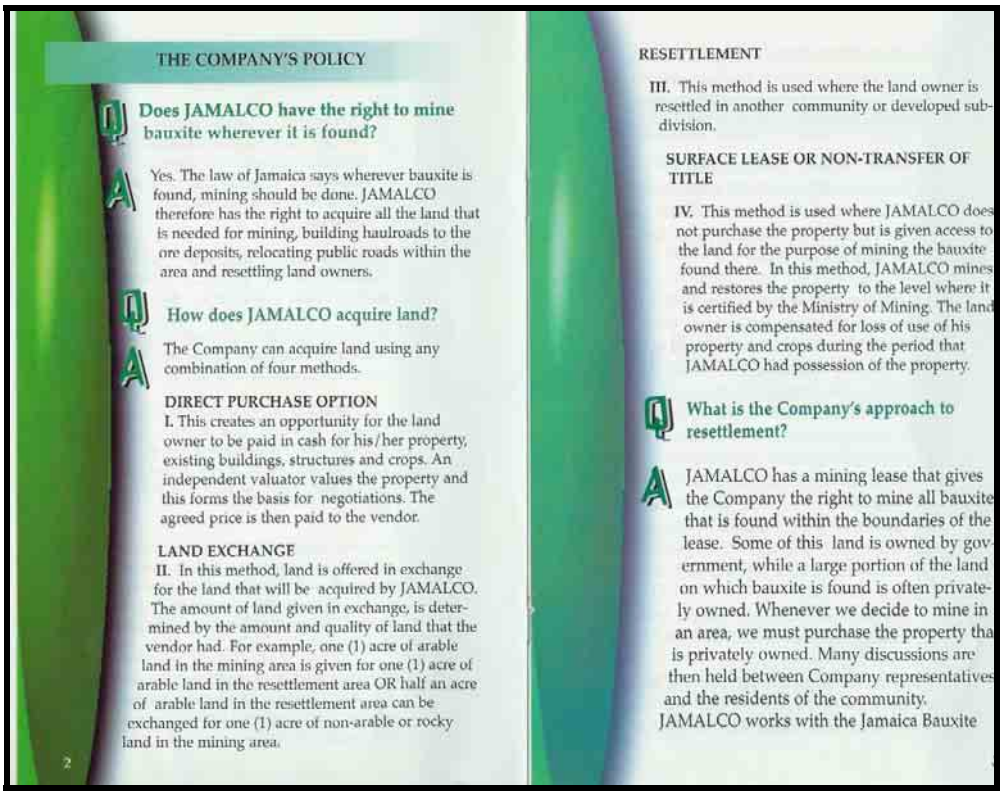
JAMALCO is a bauxite mining and alumina refining joint venture association between ALCOA Minerals of Jamaica and the Government of Jamaica. Our operations which began in 1976 are concentrated mainly in the parish of Clarendon.

Like other companies with a mining lease JAMALCO has the right by law to mine all bauxite that is found within the boundaries of the lease. In order to do this, it is sometimes necessary to relocate people. The Company ensures, however, that if individuals or communities have to be relocated, this is done as smoothly as possible.

At JAMALCO, we have been playing our part in helping to build and sustain communities through our resettlement programme. The Company also strives to ensure that persons who are relocated enjoy an improved standard of living.

Now that you are about to be resettled, JAMALCO is committed to working with you to help you to feel at ease as you go through the process. Here, we seek to answer your questions, by providing detailed information that will make resettlement easier.

Our mission is to help you to find peace of mind as you take this important step. Our people are dedicated to working tirelessly to find the right resettlement option for you.



THE COMPANY'S POLICY

Q Does JAMALCO have the right to mine bauxite wherever it is found?

A Yes. The law of Jamaica says wherever bauxite is found, mining should be done. JAMALCO therefore has the right to acquire all the land that is needed for mining, building haulroads to the ore deposits, relocating public roads within the area and resettling land owners.

Q How does JAMALCO acquire land?

A The Company can acquire land using any combination of four methods.

DIRECT PURCHASE OPTION

I. This creates an opportunity for the land owner to be paid in cash for his/her property, existing buildings, structures and crops. An independent valuator values the property and this forms the basis for negotiations. The agreed price is then paid to the vendor.

LAND EXCHANGE

II. In this method, land is offered in exchange for the land that will be acquired by JAMALCO. The amount of land given in exchange, is determined by the amount and quality of land that the vendor had. For example, one (1) acre of arable land in the mining area is given for one (1) acre of arable land in the resettlement area OR half an acre of arable land in the resettlement area can be exchanged for one (1) acre of non-arable or rocky land in the mining area.

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RESETTLEMENT

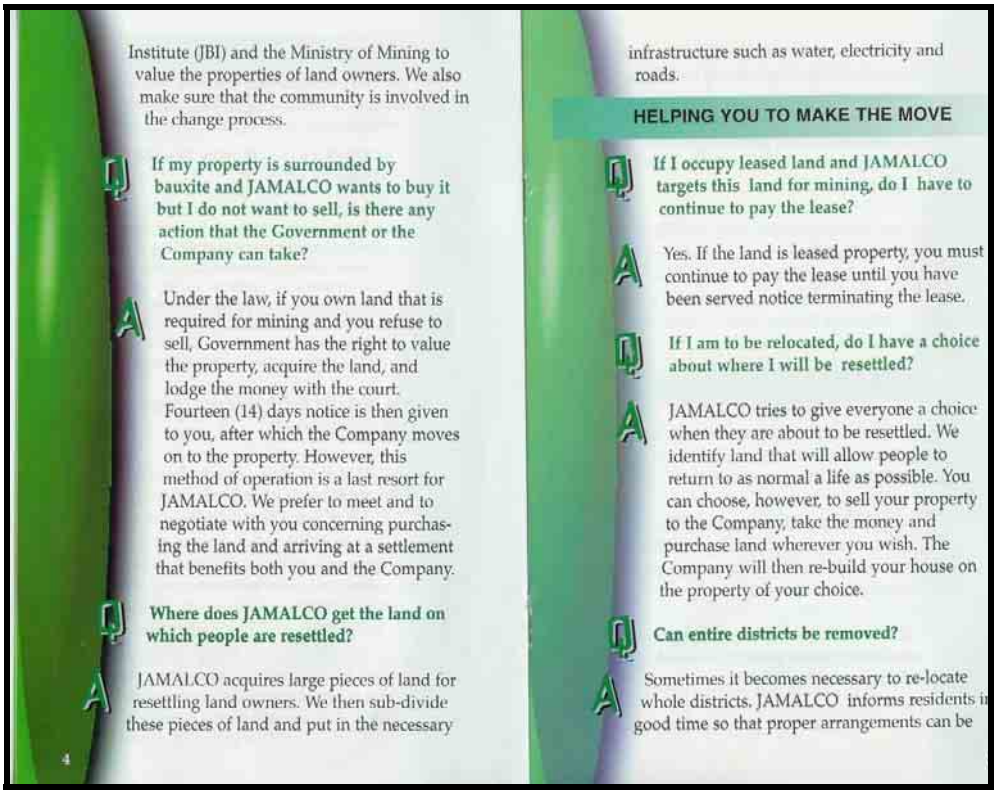
III. This method is used where the land owner is resettled in another community or developed sub-division.

SURFACE LEASE OR NON-TRANSFER OF TITLE

IV. This method is used where JAMALCO does not purchase the property but is given access to the land for the purpose of mining the bauxite found there. In this method, JAMALCO mines and restores the property to the level where it is certified by the Ministry of Mining. The land owner is compensated for loss of use of his property and crops during the period that JAMALCO had possession of the property.

Q What is the Company's approach to resettlement?

A JAMALCO has a mining lease that gives the Company the right to mine all bauxite that is found within the boundaries of the lease. Some of this land is owned by government, while a large portion of the land on which bauxite is found is often privately owned. Whenever we decide to mine in an area, we must purchase the property that is privately owned. Many discussions are then held between Company representatives and the residents of the community. JAMALCO works with the Jamaica Bauxite



Institute (JBI) and the Ministry of Mining to value the properties of land owners. We also make sure that the community is involved in the change process.

Q If my property is surrounded by bauxite and JAMALCO wants to buy it but I do not want to sell, is there any action that the Government or the Company can take?

A Under the law, if you own land that is required for mining and you refuse to sell, Government has the right to value the property, acquire the land, and lodge the money with the court. Fourteen (14) days notice is then given to you, after which the Company moves on to the property. However, this method of operation is a last resort for JAMALCO. We prefer to meet and to negotiate with you concerning purchasing the land and arriving at a settlement that benefits both you and the Company.

Q Where does JAMALCO get the land on which people are resettled?

A JAMALCO acquires large pieces of land for resettling land owners. We then sub-divide these pieces of land and put in the necessary

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infrastructure such as water, electricity and roads.

HELPING YOU TO MAKE THE MOVE

Q If I occupy leased land and JAMALCO targets this land for mining, do I have to continue to pay the lease?

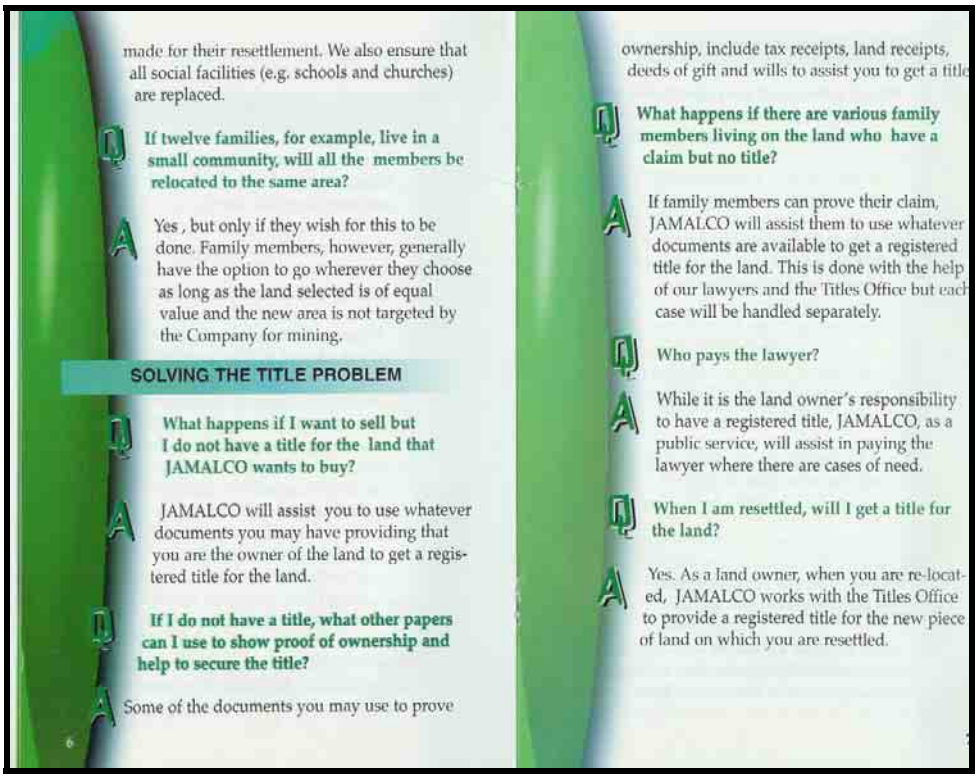
A Yes. If the land is leased property, you must continue to pay the lease until you have been served notice terminating the lease.

Q If I am to be relocated, do I have a choice about where I will be resettled?

A JAMALCO tries to give everyone a choice when they are about to be resettled. We identify land that will allow people to return to as normal a life as possible. You can choose, however, to sell your property to the Company, take the money and purchase land wherever you wish. The Company will then re-build your house on the property of your choice.

Q Can entire districts be removed?

A Sometimes it becomes necessary to re-locate whole districts. JAMALCO informs residents in good time so that proper arrangements can be



made for their resettlement. We also ensure that all social facilities (e.g. schools and churches) are replaced.

Q **If twelve families, for example, live in a small community, will all the members be relocated to the same area?**

A Yes , but only if they wish for this to be done. Family members, however, generally have the option to go wherever they choose as long as the land selected is of equal value and the new area is not targeted by the Company for mining.

SOLVING THE TITLE PROBLEM

Q **What happens if I want to sell but I do not have a title for the land that JAMALCO wants to buy?**

A JAMALCO will assist you to use whatever documents you may have providing that you are the owner of the land to get a registered title for the land.

Q **If I do not have a title, what other papers can I use to show proof of ownership and help to secure the title?**

A Some of the documents you may use to prove ownership, include tax receipts, land receipts, deeds of gift and wills to assist you to get a title

Q **What happens if there are various family members living on the land who have a claim but no title?**

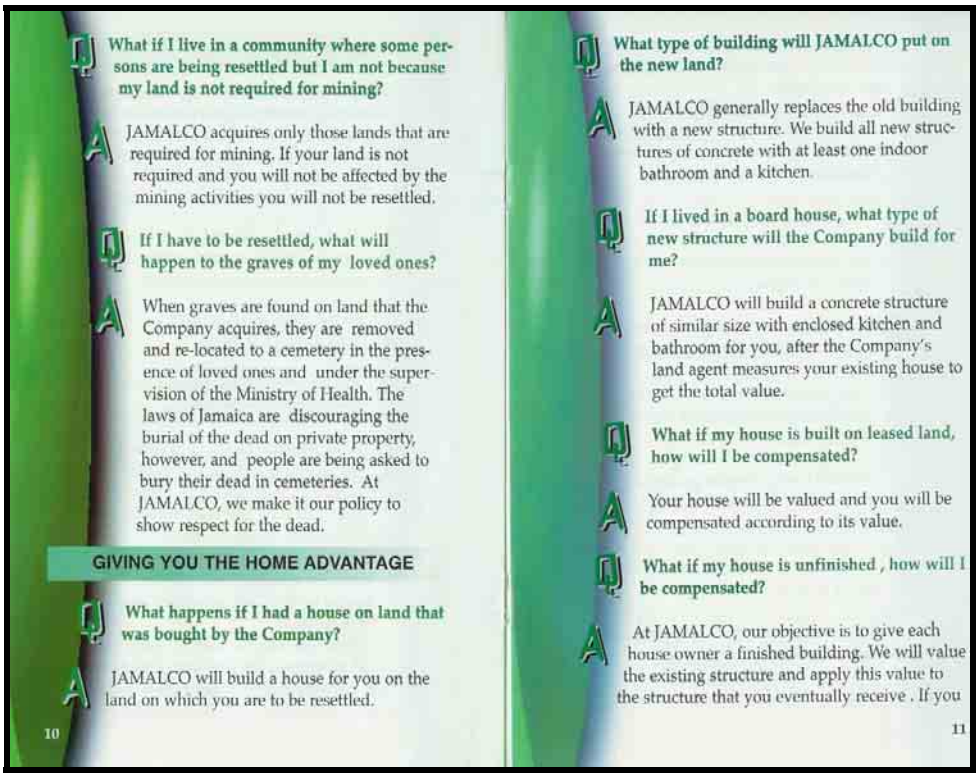
A If family members can prove their claim, JAMALCO will assist them to use whatever documents are available to get a registered title for the land. This is done with the help of our lawyers and the Titles Office but each case will be handled separately.

Q **Who pays the lawyer?**

A While it is the land owner's responsibility to have a registered title, JAMALCO, as a public service, will assist in paying the lawyer where there are cases of need.

Q **When I am resettled, will I get a title for the land?**

A Yes. As a land owner, when you are re-located, JAMALCO works with the Titles Office to provide a registered title for the new piece of land on which you are resettled.



Q What if I live in a community where some persons are being resettled but I am not because my land is not required for mining?

A JAMALCO acquires only those lands that are required for mining. If your land is not required and you will not be affected by the mining activities you will not be resettled.

Q If I have to be resettled, what will happen to the graves of my loved ones?

A When graves are found on land that the Company acquires, they are removed and re-located to a cemetery in the presence of loved ones and under the supervision of the Ministry of Health. The laws of Jamaica are discouraging the burial of the dead on private property, however, and people are being asked to bury their dead in cemeteries. At JAMALCO, we make it our policy to show respect for the dead.

GIVING YOU THE HOME ADVANTAGE

Q What happens if I had a house on land that was bought by the Company?

A JAMALCO will build a house for you on the land on which you are to be resettled.

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Q What type of building will JAMALCO put on the new land?

A JAMALCO generally replaces the old building with a new structure. We build all new structures of concrete with at least one indoor bathroom and a kitchen.

Q If I lived in a board house, what type of new structure will the Company build for me?

A JAMALCO will build a concrete structure of similar size with enclosed kitchen and bathroom for you, after the Company's land agent measures your existing house to get the total value.

Q What if my house is built on leased land, how will I be compensated?

A Your house will be valued and you will be compensated according to its value.

Q What if my house is unfinished , how will I be compensated?

A At JAMALCO, our objective is to give each house owner a finished building. We will value the existing structure and apply this value to the structure that you eventually receive . If you

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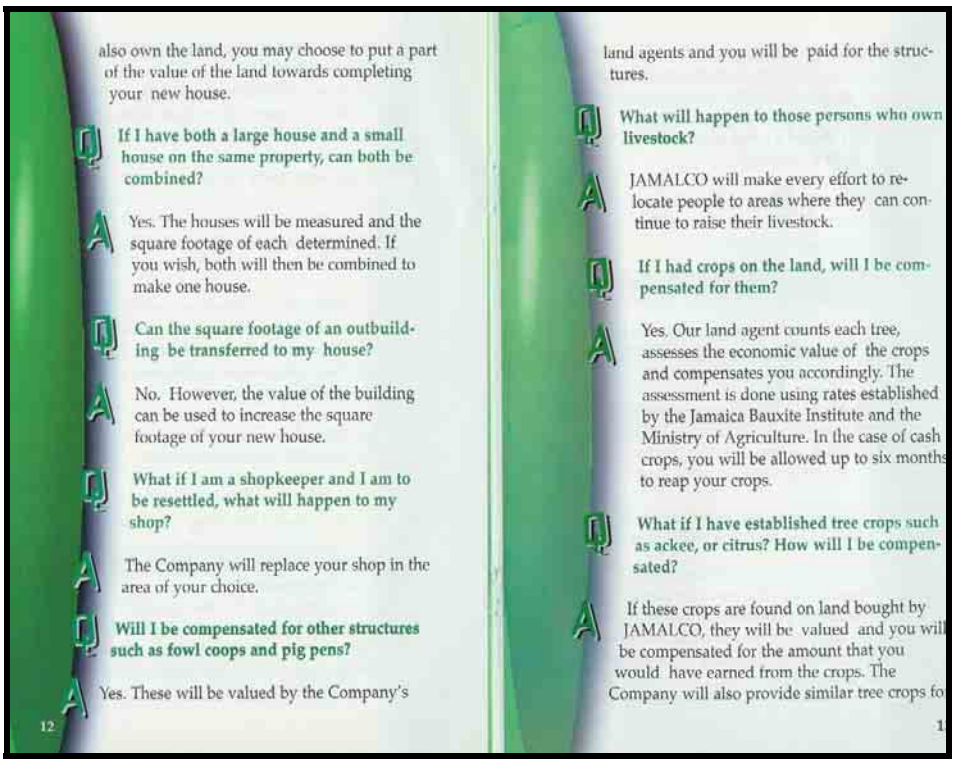

also own the land, you may choose to put a part of the value of the land towards completing your new house.

Q If I have both a large house and a small house on the same property, can both be combined?

A Yes. The houses will be measured and the square footage of each determined. If you wish, both will then be combined to make one house.

Q Can the square footage of an outbuilding be transferred to my house?

A No. However, the value of the building can be used to increase the square footage of your new house.

Q What if I am a shopkeeper and I am to be resettled, what will happen to my shop?

A The Company will replace your shop in the area of your choice.

Q Will I be compensated for other structures such as fowl coops and pig pens?

A Yes. These will be valued by the Company's

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land agents and you will be paid for the structures.

Q What will happen to those persons who own livestock?

A JAMALCO will make every effort to re-locate people to areas where they can continue to raise their livestock.

Q If I had crops on the land, will I be compensated for them?

A Yes. Our land agent counts each tree, assesses the economic value of the crops and compensates you accordingly. The assessment is done using rates established by the Jamaica Bauxite Institute and the Ministry of Agriculture. In the case of cash crops, you will be allowed up to six months to reap your crops.

Q What if I have established tree crops such as ackee, or citrus? How will I be compensated?

A If these crops are found on land bought by JAMALCO, they will be valued and you will be compensated for the amount that you would have earned from the crops. The Company will also provide similar tree crops fo

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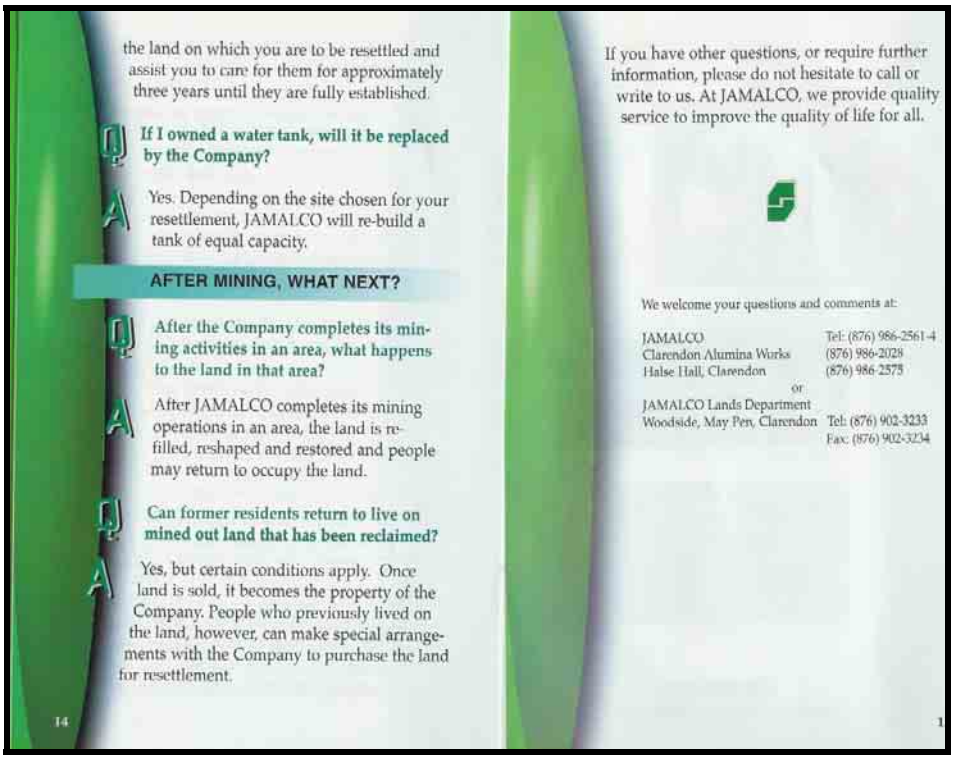

the land on which you are to be resettled and assist you to care for them for approximately three years until they are fully established.

Q **If I owned a water tank, will it be replaced by the Company?**

A Yes. Depending on the site chosen for your resettlement, JAMALCO will re-build a tank of equal capacity.

AFTER MINING, WHAT NEXT?

Q **After the Company completes its mining activities in an area, what happens to the land in that area?**

A After JAMALCO completes its mining operations in an area, the land is re-filled, reshaped and restored and people may return to occupy the land.

Q **Can former residents return to live on mined out land that has been reclaimed?**

A Yes, but certain conditions apply. Once land is sold, it becomes the property of the Company. People who previously lived on the land, however, can make special arrangements with the Company to purchase the land for resettlement.

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If you have other questions, or require further information, please do not hesitate to call or write to us. At JAMALCO, we provide quality service to improve the quality of life for all.

We welcome your questions and comments at:

JAMALCO	Tel: (876) 986-2561-4
Clarendon Alumina Works	(876) 986-2028
Halse Hall, Clarendon	(876) 986-2575
or	
JAMALCO Lands Department	
Woodside, May Pen, Clarendon	Tel: (876) 902-3233
	Fax: (876) 902-3234

Handing over the keys "Home Sweet Home"

Completed house ready for occupation

Pepper farming on resettled land

Jamalco

Better Communities. Better Lives.

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APPENDIX VI

APPENDIX VI: REFORESTATION PLAN IN JAMAICA – MEMORANDUM OF UNDERSTANDING BETWEEN MINISTRY OF AGRICULTURE- FORESTRY DEPARTMENT AND ALCOA.

CLARENDON, JAMAICA -- Alcoa and Jamaica's Forestry Department have signed an agreement to work together to rehabilitate reclaimed mined-out lands through reforestation on the island. The five-year accord includes developing a public education program, planting of suitable trees, and a research program aimed at enhancing the development and reforestation of the lands

JAMALCO and the Forestry Department in the Ministry of Agriculture (GOJ)have signed a memorandum of Understanding (MOU), to establish a framework for collaboration for the successful rehabilitation of reclaimed mined-out lands through reforestation of these areas.

This five year accord, signed recently by Jerome Maxwell, JAMALCO'S Managing Director and Marilyn Headley, Conservator of Forests, at the Halse Hall Great House in Clarendon, will see the Forestry Department and JAMALCO partnering to effect this restoration of adequate plant cover.

Guided by the 'no-net-loss' policy, the two organizations will work to compensate for the loss of forest cover due to mining operations. This move will see the establishment of new forests on selected reclaimed bauxite mined out areas as well as the protection and preservation of existing forests.

Under the MOU, the Forestry Department will utilize its skills for the establishment and management of forests, along with a forest research program aimed at enhancing the development and reforestation of the lands.

According to Miss Headley, this is in keeping with the Forestry Department's mandate outlined in the Forest Act of 1996 and which includes privately owned properties such as the JAMALCO lands.

At the signing, Mr. Maxwell, described the MOU as "timely and reflective of JAMALCO's environment protection policies and Alcoa's worldwide 'One Million Trees' project."

Specific areas of cooperation agreed on in the MOU include the development of a public education program for farmers and students to improve understanding of the contribution of forests to local and national well-being and economic development. Provisions have also been made for other areas of collaboration to be explored.

The agreement also specifically mandates the planting of suitable ornamental and lumber tree species such as cedar, ficus, acacia, wild tamarind, blue mahoe, mahogany, bitter wood, bitter damson, and spanish elm along with fruit trees such as mango, orange, avocado, breadfruit and ackee.

Appendix IV – Forest Reserves of Jamaica

Forest Reserves of Jamaica

· conservation of naturally existing forests

· as a source of forest products

· for the conservation of soil and water resources

· to provide parks and other recreational facilities for public use

· as a habitat for the protection and conservation of endemic flora and fauna

· the forest reserve areas shown in the Gazette are estimates, based on descriptive, not surveyed, boundaries

A programme of surveying forest reserve boundaries is underway and survey data are being digitised which will produce more accurate maps. In the years since the Forestry Department was established in 1937, the government has set aside a significant portion of its land for forest

reserves. They now amount to over 111,000 hectares or over 10 percent of the country's total area. These protected areas provide us with a be cared for so that their benefits can be enjoyed by future generations. The 1996 Forest Act provides for the creation and protection of forest reserves for the following purposes:

Most of the country's forest reserves are located in areas of rugged terrain such as the John Crow Mountains, Blue Mountains and Cockpit Country as well as the dry, hilly uplands in the south, west and north-west portions of the country. Despite their remoteness, serious encroachment has taken place. The 1998 analysis of forest cover and land use in Jamaica, carried out by the Forestry Department, shows that more than 20 percent of land within forest reserves has been impacted by human activity such as conversion to agricultural and/or residental use, mostly without Forestry Department permission.

Under the Forest Act, the Minister may declare to be forest reserves any Crown land, or private land if the owner requests such a declaration.

Further, the Minister may order or declare any land not in a forest reserve to be a forest management area, including private land if he is satisfied that the use of the land should be controlled for the protection of the national interest. Crown lands may be declared a protected area if required for a number of purposes specified in the Forest Act, including flood and landslide .Further, the Minister may order or declare any land not in a forest reserve to be a forest management area, including private land if he is satisfied that the use of the land should be controlled for the protection of the national interest.

Crown lands may be declared a protected area if required for a number of purposes specified in the Forest Act, including flood and landslide protection, soil preservation, erosion, maintenance of water supply and protection of amenities, flora and fauna. On protected areas cultivation, grazing, burning and clearing of vegetation is prohibited or strictly regulated.

The forest reserve areas listed in the following table are garnered from The Jamaican Gazette. The records show that the area of forest reserves and Crown lands managed by the Forestry Department is 109,514 hectares, of which 98,962 hectares are forest reserves and 10,552 hectares are Crown lands. These figures from the Gazette show a variation from those compiled by the Forestry Department in its recent assessment of forest cover and land use. The reasons for the difference are:

· the forest reserve areas compiled by the Forestry Department during its assessment were digitised from 1:250 000 maps and not from actual surveyed forest reserve boundaries.

Parish Remarks

Forest Reserves of Jamaica by Parish

Forest Reserve/

Crown Land Name

Area (ha) Reference in the

Manchester Denham Farm 20.00 27-09-1956 486 Part of Devon Land Settlement

Gourie 141.65 Crown

Hudson's Bottom 226.63 Crown

John Anderson 121.40 Crown

New Forest 160.78 01-12-1950 432 Part of New Forest Land Settlement

Oxford 133.55 Crown

Ramble 48.18 01-12-1950 435

St. Jago A 163.90 09-10-1969 654 Plan A, Vol 1030 Fol 433

St. Jago B 66.00 09-10-1969 654 Plan B, Vol 1030 Fol 433

Virginia 13.03 01-12-1950 434 Part of Virginia Land Settlement

Total Manchester 472 623

Clarendon Bull Head 220.06 01-12-1950 417

Kellets-Camperdown 1497.79 01-12-1950 417

Kellits Stream A 8.30 01-12-1950 425 Block A (Miller's Spring)

Kellits Stream B 1.62 01-12-1950 425 Block B (Mosquito River)

Peace River 116.70 25-06-1959 423

Peak Bay A 302.72 01-12-1950 433 Block A

Peak Bay B 152.57 01-12-1950 433 Block B

Peak Bay C 60.70 01-12-1950 433 Block C

Peckham 70.89 01-12-1950 426 Prev. 06-09-1945 (part of Peckham Land Sett.)

Pennants A 169.19 01-12-1950 437 Block A (part of Pennants Land Sett.)

Pennants B 59.40 01-12-1950 438 Block B (part of Pennants Land Sett.)

Pennants (Douces) A 26.42 01-12-1950 438 Block A (part of Pennants Land Sett.)

Pennants (Douces) B 3.07 01-12-1950 438 Block B (part of Pennants Land Sett.)

Pennants (Douces) C 2.55 01-12-1950 438 Block C (part of Pennants Land Sett.)

Portland Ridge 5612.30 Crown Vol 403 Fol 40

Teak Pen A 532.99 01-12-1950 439 Block A (part of Teak Pen Land Sett.)

Teak Pen B 149.74 01-12-1950 440 Block B (part of Teak Pen Land Sett.)

Total Clarendon 3375 5612

St. Catherine Dawson Mountain 1 55.04 Crown Lot 101, Mount Dawson Land Settlement

Dawson Mountain 2 75.86 Crown Lot 104, Mount Dawson Land Settlement

Harkers Hall 6.82 01-12-1950 425 Prev. 06-09-1945 (Harkers Hall Land Sett.)

Healthshire Hills 4856.40 01-12-1950 422

Treadways 26.39 01-12-1950 422 Part of Treadways Land Settlement

Troja 18.86 21-07-1955 362 Lot 41, Troja Land Settlement

Twickenham Park 2.06 Crown

Little Goat Island 6.00 30-06-1960 278 2.4 km south of the mainland

Great Goat Island 188.00 30-06-1960 278 2.0 km south of the mainland

Total St. Catherine 5102 133

TEAM MEMBERS

APPENDIX VII: TEAM MEMBERS

Project Team

- **Dr. Conrad Douglas**
- **Mr. Paul Thompson**
- **Dr. Art Reid**
- **Prof. Edward Robinson**
- **Ms. Winsome Young**
- **Mr. Orville Grey**
- **Mr. Burklyn Rhoden**
- **Mr. Noel Watson**
- **Geomatrix Ltd.**
- **Ms. Dahlia Bean**
- **Ms. Deonne Caines**
- **Mr. Vance Johnson**